1852-53. LIV

SECOND REPORT

OF

THE COMMISSIONERS

FOR THE

EXHIBITION OF 1851,

TO THE

RIGHT HON. SPENCER HORATIO WALPOLE, &c. &c.

ONE OF HER MAJESTY'S PRINCIPAL SECRETARIES OF STATE.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY W. CLOWES & SONS, STAMFORD STREET,
FOR HER MAJESTY'S STATIONERY OFFICE.

1852.

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SUPPLEMENTAL CHARTER.

VICTORIA, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, to all to whom these Presents shall come, Greeting :—Whereas, by a Charter under Our Great Seal, bearing date at Westminster, on or about the Fifteenth day of August, One thousand eight hundred and fifty, after reciting that We had issued Our Commission, under Our Royal Sign Manual, bearing date on or about the Third day of January, One thousand eight hundred and fifty, for the promotion of the Exhibition of the Works of Industry of All Nations, to be held in the year One thousand eight hundred and fifty-one, and had thereby for that purpose appointed Our most dearly beloved Consort, His Royal Highness Francis Albert Augustus Charles Emanuel, Duke of Saxony, Prince of Saxe Cobourg and Gotha, Knight of Our Most Noble Order of the Garter, and Field Marshal in Our Army, and the several other Persons therein mentioned, to make full and diligent inquiry into the best mode by which the productions of Our Colonies and Foreign Countries might be introduced into Our Kingdom, as respected the most suitable site for the said Exhibition, the general conduct of the said Exhibition, and also into the best mode of determining the nature of the Prizes, and of securing the most impartial distribution of them; and that We did thereby give to Our said Commissioners, or any three or more of them, certain powers and authorities therein contained; and reciting that it had been represented to Us by Our said Commissioners then acting under Our said Commission, that they had proceeded in the inquiries and in the execution of the other matters intrusted to them by Our said Commission, and that it was expedient not only to continue to them the said powers and authorities, but also that they should have full powers and authorities to carry out and conduct the said Exhibition, and for that purpose to nominate and appoint such number of persons as they might think fit, with powers and authorities adequate for the effectually carrying out, and conducting, and completing the said Exhibition, and all matters and things relating to and concerning the same; and that they had therefore prayed that We would grant to them Our Royal Charter of Incorporation for the purposes aforesaid: We did, by Our said Charter now in recital, grant and ordain that our said dearly beloved Consort, and the several other Persons therein mentioned, and the survivors or survivor of them, and such other persons, if any, as should be elected by them, as thereinafter mentioned, should be one Body Politic and Corporate, by the name of "The Commissioners for the Exhibition of 1851," and by that name should have perpetual succession subject as thereinafter provided, and a Common Seal; and We did thereby declare that the said Corporation should be established for the purposes thereinafter mentioned; and that the inquiries and matters directed to be made and done by Our said Commissioners should be made and done by the said Commissioners thereby incorporated;

and that no further proceeding should be had under Our said Commission; and that the capital or joint stock of the said Commissioners thereby incorporated should be such sums of money as had been then subscribed towards the establishment of the said Exhibition, and other the monies which should come to the hands of the said Commissioners thereby incorporated; and We did, by Our said Charter, authorize and appoint that the said Commissioners thereby incorporated should make such inquiries as are therein mentioned, and should carry out and conduct the said Exhibition in the year One thousand eight hundred and fifty-one, and distribute the Prizes, and do all matters connected with the said Exhibition and distribution of Prizes, and dispose of all monies which by any of the means therein mentioned should come to their hands, in all respects as they should think fit, towards the purposes of the Exhibition, or otherwise in the execution of the powers thereby given to them; and it is by Our said Charter provided, that when and as soon as all the matters and things entrusted to be done by Our said Charter by the said Commissioners thereby incorporated, should have been fully performed, or become incapable of being executed, and the same should have been certified in writing to one of Our Principal Secretaries of State, then Our said Charter, and every matter or thing therein contained, should be absolutely void; and whereas the said Commissioners so incorporated as aforesaid, did, by a Report made to Us under their Corporate Seal, and dated the Sixth day of November, One thousand eight hundred and fifty-one, state, amongst other things, that the Exhibition for the promotion of which they were appointed was finally closed on the Fifteenth day of October of this year, and that the Medals and Prizes had been awarded as in the Report is mentioned, and that the said Commissioners were then engaged in bringing to a close all the business connected with the Exhibition, and in defraying the various expenses incurred during its progress; that most of the claims on the funds at their disposal were then discharged, and that, after all should have been satisfied, a considerable surplus would remain, and that such surplus would consist in the balance which might remain in their hands after deducting all expenditure from the sum which had been received from subscriptions, entrance fees, and casual receipts; that of the entrance fees a portion had been paid by foreign visitors, and that it was owing to the fact that the contributions of all nations were there displayed that the number of visits made by persons attracted to the Exhibition amounted to upwards of six millions; that the subscriptions, with few exceptions, were derived from Our subjects, and were made after a public announcement that they must be "absolute and definite;" but that should any surplus remain, it was the intention of Our said Commissioners to apply the same to purposes strictly in connection with the ends of the Exhibition, or for the establishment of similar Exhibitions for the future; and further, the said Commissioners did, by their said Report, represent to Us, that for the reasons in the Report mentioned, they were of opinion that it was not advisable to apply the said surplus to the last-named purpose; and that they were of opinion that greater benefit might be derived by the public from a judicious application in the interval (between the last and any similar Exhibition) of the means at their disposal to the furtherance of the general objects for which the Exhibition was designed, and in such manner that the advantages which might be obtained should not be confined solely to Our subjects, but should be shared, as far as might be possible, by other countries; and further, that the said Commissioners were of opinion that no mea-

sures could be so strictly in accordance with the ends of the Exhibition as those which might increase the means of industrial education, and extend the influence of science and art upon productive industry; and the said Commissioners further stated in such Report that they were aware of the difficulty of devising a comprehensive plan to meet those objects, but that should the view which they had taken as to the manner of fulfilling their pledges meet Our approbation, the said Commissioners assured Us that they would give their fullest and most careful consideration to that important subject; and the said Commissioners suggested that time should be afforded to them to consider and mature such a plan as they should feel warranted in laying before Us; the more so as, from the disproportion between the end proposed and the means applicable to it, much would depend on the extent of co-operation they might receive from the public; and further, the said Commissioners stated that they were advised that their powers under Our said Royal Charter would cease when all the expenses incidental to the Exhibition had been discharged and notice thereof given to Our Secretary of State, and that they had no power of deciding upon the disposal of the surplus; and the said Commissioners stated, that if it were Our pleasure that they should act further in the matter, it would be necessary before they could take even any preliminary step, that We should grant to them, by Royal Charter, such further powers as we might deem necessary, to enable them to lay before Us a scheme for the application of the surplus in accordance with the expectations held out to the public, and with Our sanction and approval to adopt such measures as might be necessary for such purpose; and whereas all the matters and things entrusted by Our said Charter to be done by the said Commissioners have not yet been fully performed, and the Commissioners incorporated by Our said Charter still are and continue a Body Corporate; and whereas We are desirous of further continuing the same, and of granting to the said Commissioners so incorporated as aforesaid such further powers as are hereinafter mentioned: NOW KNOW YE, that as well on the suggestion of the said Commissioners so incorporated as aforesaid, as of Our especial grace, certain knowledge, and mere motion, WE DO, by these presents for Us, Our heirs and successors, grant and ordain that the said Commissioners so incorporated as aforesaid shall continue and be incorporated: And We do by these presents incorporate them accordingly, as well for the purposes for which they were so first incorporated as aforesaid, as for the purpose of devising a plan for the disposal of the surplus of all monies which shall, as aforesaid, remain at their disposal after all the expenses relating to the said Exhibition shall have been defrayed, and which in their opinion shall be in accordance with the expectations so held out to the public as aforesaid, and also in all respects for carrying into effect any plan or plans which may be from time to time devised by them as aforesaid. And We do hereby authorise and empower the said Commissioners to dispose of all such surplus as aforesaid, and the income thereof which may be at their disposal, in the furtherance of any such plan or plans as may from time to time be devised by them as aforesaid, and to lay out and invest the same, or any part thereof, till required for the execution of any such plan or plans, on such securities and in all respects as they may think fit, and generally to do and execute all and every matter and thing whatsoever which they may consider necessary to be done for the carrying out any such plan or plans as aforesaid, or in anywise relating thereto, or in maintaining and directing any Establishment or Institution to be founded in pursuance of any such

plan or plans. AND FURTHER, that for the purposes of carrying out any such plan or plans, or executing any of the matters aforesaid or otherwise incidental thereto, It shall be lawful for the said Commissioners from time to time to appoint any Committee or Trustees, or other persons, for the execution of any matters or things connected with the execution of any such plan or plans. And further, We do hereby declare that in addition to such surplus as aforesaid, it shall be lawful for the said Commissioners to receive any monies or other property and effects by way of contribution, fees, payments, or otherwise, from any persons or bodies, and to apply and appropriate such monies or property in all respects as the said surplus is hereby directed to be applicable, or specially to apply all or any part of any such contributions or monies which may be so received as aforesaid for any particular purposes or objects, which, in the opinion of the said Commissioners, shall be connected in anywise with any such plan or plans as aforesaid: And We do hereby declare that, for the purposes aforesaid, or any of them, the said Commissioners and their successors may, and We do hereby grant to them full license and authority to purchase and hold lands and hereditaments in any part of Our dominions, and that such lands and hereditaments may be from time to time appropriated, sold, leased, or otherwise applied or disposed of in all respects as the said Commissioners shall think fit: And We do hereby in all respects ratify and confirm Our said herein recited Charter, and do declare that the said Commissioners thereby incorporated, and the survivors or survivor of them, and other the persons to be appointed Members of the said Corporation, as in our said Charter is provided, shall continue incorporated under and by virtue of these presents, as well for the purposes declared by the said Charter as for the purposes hereby declared; and that the power of appointing and electing Members of the said Corporation hereby established, contained in our said recited Charter, shall, in all respects, apply to the said Corporation hereby made and established. And We do hereby direct that the said Commissioners so incorporated as aforesaid, may from time to time, when and as they shall think fit, under their Corporate Seal, report to one of Our Principal Secretaries of State on all and every or any of the matters which they may do under the powers hereby given. And further, that the said Commissioners shall in like manner report on all and every or any of the matters which they may do, when and as they may be thereto required by any one of Our Principal Secretaries of State: And We do further declare, that when as well all the matters and things intrusted to be done by Our said recited Charter by the said Commissioners thereby incorporated, as all the matters and things hereby intrusted to be done by the said Commissioners, shall be fully performed, or become incapable of being executed, and when the same shall have been certified in writing to any of Our Principal Secretaries of State by any three or more of the Commissioners for the time being Members of the said Corporation, then Our said recited Charter and these presents shall be absolutely void. In witness whereof, We have caused these Our Letters to be made patent. Witness Ourself, at Our Palace of Westminster, the second day of December, in the fifteenth year of Our Reign.

By Writ of Privy Seal,

EDMUNDS.

SECOND REPORT

OF THE

COMMISSIONERS FOR THE EXHIBITION OF 1851,

TO THE

RIGHT HON. SPENCER HORATIO WALPOLE, &c. &c.,

One of Her Majesty's Principal Secretaries of State.

Sir,

In pursuance of the announcement contained in our Report of the 24th of April last, to the effect that we were engaged in making the necessary inquiries on the subject of the disposal of the Surplus Funds arising from the Exhibition, which will remain in our hands after all our liabilities shall have been discharged, we have now the honour to transmit to you this further Report, containing the result of our labours, as far as they have as yet proceeded, in order that it may be submitted to Her Majesty for Her approbation.

Preliminary Report to the Crown.

In a preliminary Report addressed by us to Her Majesty, on the 6th of November last year, we humbly stated that we had reason to believe that the surplus which would finally remain in our hands would not be less than 150,000*l.*; that it was owing to the international character of the Exhibition that much of its pecuniary success was attained; that we were of opinion that the best mode of applying the means at our disposal would be by furthering the general objects of the Exhibition,—those objects having been the advancement of human industry, and the promotion of kindly international feelings; but that we were advised that, under our original Charter of Incorporation, we had no power of deciding upon the disposal of the surplus.

We therefore humbly prayed that the Queen would be graciously pleased to confer upon us, by means of a Supplemental Charter, such further powers as might be deemed necessary, in order to enable us to lay before Her Majesty a scheme for the application of the surplus, and, with Her Majesty's sanction and approval, to adopt such measures as might be necessary for such purpose.

At the same time we assured Her Majesty that, if it were Her pleasure that we should act further in reference to this important subject, we would give it our fullest and most careful consideration; and we suggested that full time should be afforded us to consider and mature such a plan as we should feel warranted in laying before Her Majesty. But we took leave to state our opinion that the plan ought to be one which in its general character might serve to increase the means of Industrial Education, and extend the influence of Science and Art upon Productive Industry.

Supplemental Charter.

In accordance with the prayer of our application, Her Majesty was graciously pleased to confer upon us the Supplemental Charter, which is prefixed to this Report, and which bears date the 2nd of December, 1851.

This Charter gives us the power to dispose of the surplus in the furtherance of any plans that may be devised by us, to invest it in such manner as we may

think fit, and generally to do whatever we may consider necessary for carrying out such plans, or maintaining and directing any establishment or institution to be founded in pursuance of them. It also empowers us to receive contributions in aid of the surplus, and to apply them in the furtherance of such plans; it gives us power to purchase and hold lands and hereditaments in any part of Her Majesty's dominions, and to apply or dispose of them in all respects as we may think fit.

It moreover confirms our original Charter of Incorporation, and declares that the power of appointing and electing Members of the Commission which it conferred upon us, shall in all respects apply to the Corporation established by the Supplemental Charter;* and it directs us to report from time to time, as we may think fit, to the Secretary of State, on all or any of the matters to which it relates.

The very extended powers conferred upon us by the Charter which Her Majesty has been thus graciously pleased to grant us, demand the expression of our humble thanks for this proof of the interest taken by Her Majesty in the objects of our incorporation, and at the same time of our deep sense of the responsibility imposed upon us by so gracious a mark of confidence.

Amount of Surplus.

In our Report of the 24th of April last, we stated that the balance remaining in our hands on the 29th of February, amounted to 213,305*l.* 15*s.* 8*d.*; that we were not then in a position to report with accuracy what portion of this sum would be the actual net surplus, after every liability had been discharged and the accounts finally wound up; and we instanced various items of expenditure which still remained payable before the amount of the net surplus could be correctly stated. But we at the same time repeated the belief, previously expressed by us, that in no case would that amount be less than the minimum of 150,000*l.*

It now affords us much satisfaction to give in the Appendix a statement showing the amount of the claims upon us that have been discharged since the above date, together with an estimate of our present liabilities, and of the probable net amount of the surplus, which will appear by it to be (in round numbers) 170,000*l.* (See Appendix A.)

Receipts and Disbursements since February.

In pursuance of the directions contained in our Supplemental Charter, to the effect that we should from time to time report to the Crown as to our proceedings, we shall not fail to lay before Her Majesty the necessary returns, duly audited, respecting our financial position, continued from the date of the former returns, viz., the end of February last. It will, however, be seen, by reference to the Appendix just mentioned, that our receipts and disbursements, in connexion with the winding-up of our accounts, for the eight months commencing March 1st, and ending October 31st, have been as follows:—

	£.	s.	d.
Receipts	6,532	2	7
Expenditure	25,199	15	3

* The Commisioners elected in pursuance of this power, since the date of the First Report, are:—

1. Sir A. Y. Spearman, Member of the Finance Committee.
2. Mr. W. Coulson, Q.C.
3. Mr. C. W. Dilke, late member of the Executive Committee.
4. Mr. Shepherd, late Chairman of the East India Company, on his ceasing to be an *ex-officio* Commissioner.

In addition to the pecuniary funds at our disposal, we are in the possession of a collection of articles which have been presented to us by exhibitors and by foreign Governments. The value of this collection has been estimated at nearly 9,000*l.*, and very many offers of further important contributions have been made to us, which contributions are only withheld until a suitable place of deposit for them shall have been provided. The collection at present in our possession has, by the gracious permission of Her Majesty, been temporarily deposited in Kensington Palace. Collection of Articles.

A large number of suggestions and applications, in reference to the disposal of the surplus, have been made to the Commissioners; a tabular statement of the more important of which, specifying their nature, and the source whence they proceeded, is appended to this Report. (See Appendix B.) Suggestions and Applications as to disposal of Surplus.

The answer which the Commissioners have returned to the different applications submitted to them, has been to show, by reference to their preliminary Report to Her Majesty, of the 6th of November last year, that they do not feel themselves to be in a position to comply with proposals which involve the surplus being applied to purposes of a limited, partial, or local character, or to returning to the different localities, in order to be there appropriated to local public objects connected with the progress of Art, Science, and Education, the amount of subscriptions originally raised in each place, which subscriptions were at the time made on the clear understanding that they must be "absolute and definite."

The Commissioners would call especial attention to the memorials from the important manufacturing and commercial towns of Birmingham, Bristol, Halifax, Hull, Oldham, Sheffield, and the Staffordshire Potteries, which are appended to this Report, and indicate clearly the strong feeling entertained by those well entitled to form an opinion on this subject, of the importance of establishments for instructing those engaged in Trade and Manufacture in the principles of Science and Art on which their respective industries depend. (See Appendix C.)

These applications and the general tone of public feeling have confirmed the views of the Commissioners, as before expressed to Her Majesty, that the requirement most felt by the country is an Institution which, in the words already employed by them, should "serve to increase the means of Industrial Education, and extend the influence of Science and Art upon Productive Industry." General tendency of such Memorials, and Commissioners' views respecting them.

We are of opinion that if the surplus were applied in furtherance of one large Institution devoted to the purposes of instruction, adequate for the extended wants of industry, and in connexion with similar institutions in the provinces, it would be productive of important results; whilst, if subdivided amongst many local institutions, as suggested by some of the memorials to which reference has been made (such as those from Warrington, Blackburn, &c.), the effects produced would be comparatively insignificant.

It is further our opinion, that the greatest amount of benefit would be conferred on the community, if such an Institution as that indicated by us were established in the Metropolis, and rendered capable, by scholarships and by other means, of affiliating local establishments over this country, in India,* and Her Majesty's

* The desire felt in India for such Institutions is shown by the recent establishment at Madras of a Museum of Economic Geology, attached to which is a School of Industrial Arts.

colonial possessions, whereby the results of its labours might be disseminated as widely as possible, and great advantage derived from a constant interchange of information between the parent institution and the bodies associated with it.

It also appears to us desirable that the proposed Institution should act in concert with foreign Institutions of a similar character; and we also consider that every advantage which the new Institution might offer should be shared equally by the citizens of all countries, and that, by giving facilities to those who might desire to visit this country with a view to inform themselves on subjects relating to science, arts, manufactures, and commerce, some return might be made for the generous co-operation of all nations in the Exhibition of last year; a continuance of the friendly relations which we trust that Exhibition has inaugurated might be ensured; and this nation might continue to benefit by an interchange of knowledge with them.

The basis for the formation of the desired local connexion at home would appear already to exist in the Provincial Schools of Design, of which more than twenty are at present established in this country,—in various industrial institutions, such as the School of Arts in Edinburgh, the School of Mines in Newcastle, &c.,—and in the several Mechanics' Institutes belonging to different towns.

The Schools of Design are supported, at present, partly by Parliamentary grants, and partly by local subscriptions and the fees received from students; while the Mechanics' Institutes referred to have not only endeavoured of late years to extend their importance as institutions for systematic instruction, but have manifested a strong desire to enter into connexion with a central institution in London, as evinced at an important and influential meeting held at the Society of Arts on the 18th of May last, which has resulted in the union of more than 220 institutions, numbering upwards of 90,000 members, all in correspondence with that Society. (See Appendix D.)

The Royal Dublin Society, which receives an annual Parliamentary grant of more than 6000*l.* for the payment of its professors, and for the other purposes of the Society, and which is in the habit of sending lecturers to the provincial towns, on their application, may also be instanced.

Institutions for Industrial Instruction exist in most of the Continental States, and have been growing into increased development during the last fifteen years. The marked increase in continental production has been partly ascribed to the knowledge of natural forces communicated to those engaged in industry by these institutions. In countries in which fuel and the materials of machinery either did not exist, or were not abundant, it was natural to depend more upon the intellectual element of production than in this country, where their abundance gave an impulse to labour, and created much practical experience. It has long been a principle of Foreign States that the application of science and art to production would more than balance a greater cheapness in raw material; and that the increased facilities of locomotion rendered the latter of less value as an element of manufacture, while it enabled the experience of other nations to be more readily acquired, and consequently would, in process of time, convert industrial competition into one involving the most economical application of natural forces. We beg to refer to extracts (see Appendix E) from a lecture by Dr. Playfair, who has recently visited many institutions for industrial instruction abroad, and who

describes them as being, generally, in a high state of efficiency. The best proof of their utility to production is, that there is a constantly increasing demand, by those engaged in industry, for the pupils reared at them ; and, as a consequence of this, it is found that the number of pupils is everywhere augmenting. It is calculated that in Germany alone 13,000 men annually receive the high technical and scientific training of the Trade Schools and Polytechnic Institutions ; while more than 30,000 workmen are being systematically taught the elements of science and of art, in schools which communicate instruction to them in their leisure hours.

Besides the Trade Schools which are now scattered throughout Germany, there are important institutions, equivalent to Industrial Universities, in the capitals of nearly all the German states. Their systems of instruction have certain variations, but they are all agreed upon the general principle, that their object is to teach the principles of science and art upon which production depends, explaining fully the variations and nature of technical processes, but leaving them afterwards to be practically learned in the workshop or the factory. They rather teach a pupil how to be an intelligent manufacturer than profess to make him one at the institution. Elementary knowledge in science is rarely given at these higher schools, as the pupil who enters them must previously possess it, the courses of instruction there being devoted to the application of that knowledge. So essential to the progress of industry are these Technical Colleges considered, that even small states, such as the Grand Duchy of Baden, support them at great expense. Thus the Institution at Carlsruhe, situated in a large and commodious building, with every appliance of museums, laboratories, and workshops, teaches 330 pupils, with the aid of no less than 41 professors and teachers. In France the *Ecole Centrale des Arts et Manufactures*, a private institution raised by private capital, which has found and continues to receive the most ample remuneration in its success, annually educates 300 pupils in the highest branches of applied science and art ; while its influence on industry has been found so important, that the Government and the Councils-General of 29 departments of France have established Exhibitions in connexion with it, in order to educate poor persons of extraordinary talent. The pupils of this establishment find immediate employment on leaving the school, and already above 500 of them are known to be holding stations of much importance in almost all parts of the world. The school is now found to be too small for the demands of French industry, and its enlargement is under contemplation. We must, however, simply refer to the extracts from Dr. Playfair's lecture for further information on the industrial institutions of other countries, both as regards the instruction of the middle classes and of artisans, remarking that the evidences of the increase in the number of the pupils, as well as the readiness with which they obtain employment, would afford sufficient proof of their influence upon industry, were there no other direct testimony to the important influence which they are exercising on the rapid development of production in foreign states.

List of existing Institutions in London.

In considering what has been already done by the public in this country to promote the interests of Science and the Arts, and the diffusion of scientific principles amongst those engaged in their practical application, the Commissioners find that much zeal has been shown in this respect, as will be seen

by the following list of institutions now established in and about the Metropolis alone which have these objects more or less in view :—

Academy of Music, Royal
Agricultural Society, Royal
Antiquaries, Society of
Apothecaries, Society of
Architects, Royal Institute of British
Archæological Association.
Archæological Institute.
Art-Union of London.
Arundel Society.
Asiatic Society, Royal
Astronomical Society, Royal
Beaumont Literary and Philosophical Institution.
Botanical Society of London.
Botanic Society of London, Royal
British Association for the Advancement of Science.
British Institution.
Camberwell Athenæum.
Camberwell Institute for the Industrial Classes.
Camberwell Literary and Scientific Institution.
Cavendish Society.
Chemical Society.
College of Chemistry.
College of Physicians.
College of Surgeons.
Crosby Hall Literary and Scientific Institution.
Entomological Society.
Epidemiological Society.
Ethnological Society.
Floricultural Society.
General Literary and Scientific Institution.
Geographical Society, Royal
Geological Society.
Greenwich Society for the Diffusion of Useful Knowledge.
Hackney Literary and Scientific Institution.
Hammersmith Literary and Scientific Institution.
Harveian Society.
Highgate Literary and Scientific Institution.
Horticultural Society.
Hunterian Society.
Institution of Civil Engineers.
Islington Athenæum.
Islington Literary and Scientific Society.
Jews and General Literary and Scientific Institution.
Kensington Institute.
Kentish Town Literary Society.
Linnæan Society.
Literature, Royal Society of
London Institution.
London (East) Literary and Scientific Institution.
London Library.
London (City of) Literary and Scientific Institution.
London Mechanics' Institution.
London (City of) Mechanics' Institute.
London (North) Artisans' Drawing and Modelling School.
London (South) Chemical and Philosophical Society.
London (West) Literary Institution.
London and South-Western Literary and Scientific Institution.
Marylebone Literary & Scientific Institution.
Marylebone and Paddington Literary and Scientific Institution.
Medical Society of London.
Medical and Chirurgical Society, Royal
Medico-Botanical Society.
Meteorological Society.
Microscopical Society.
National Institution of Fine Arts (Portland Gallery).
Numismatic Society.
Ornithological Society.
Palæontographical Society.
Pathological Society.
Pharmaceutical Society.
Pimlico Literary and Scientific Institution.
Polytechnic Institution.
Poplar Literary and Scientific Institution.
Ray Society.
Rotherhithe and Bermondsey Literary and Scientific Institution.
Royal Academy.
Royal Institution.
Royal Society.
Russell Institution.
St. George's Lending Library.
St. James's Literary and Scientific Institution.
Society of Arts.
Society of British Artists.
Society of Painters in Water Colours.
Society of Painters in Water Colours (New).
Southwark Literary Institution.
Southwark and Lambeth Artisan School for Drawing and Modelling.
Statistical Society.
Sydenham Society.
Syro-Egyptian Society.
Walworth Literary and Scientific Institution.
Western Literary and Scientific Institution.
Western Medical and Surgical Society.
Westminster Literary and Scientific Institution.
Whittington Club and Metropolitan Athenæum.
Woolwich Literary, Scientific, and Mechanics' Institute.
Zoological Society.

The list of these institutions (about one hundred in number), which is probably far from complete, will serve to indicate the great extent to which the Public voluntarily tax themselves for the purpose of advancing the above-mentioned ends.

Annual Expenditure on them.

It is not easy to give an exact statement of the total sum annually expended in London on institutions such as those now alluded to, but from information obtained from the balance-sheets published by a considerable number of them, and from other sources, the Commissioners have ascertained that they are not over-estimating it in stating it at 160,000*l.*

It is well known that a very considerable portion of the expenses at present incurred by each society is for house-rent, taxes, and items of a similar nature, all of which outlay is of course deducted from the purposes of utility to which it might otherwise have been applied.

National Institutions in London, and their Annual Cost to the Country.

In addition to the private institutions and societies comprised in the above list, there are several of a national character which are solely supported by the public money, and which it is necessary to refer to, in order to show what is at present being done in the Metropolis alone towards the promotion of Science and the Arts. We need only mention the British Museum, the National Gallery, the Museum of Practical Geology, and the School of Mines attached to it, and the Department of Practical Art (known until recently as the School of Design).

The amount which it is proposed to expend on each of these during the present financial year, as shown by the estimates submitted to Parliament last Session, and voted by it, will be seen by referring to Appendix F. The total annual outlay on these national institutions, independently of the sums intended to be spent in connexion with them, but out of London, appears by this Return to be about 95,000*l.*, which if added to the sum of 160,000*l.* just estimated, would represent a total expenditure in this capital of more than a quarter of a million sterling per annum on the above-mentioned public and private institutions; a fact which, while it shows that much effort both on the part of the State and of the Public is made for the promotion of Science and Art, makes it the greater subject of regret, that, owing to a want of unity and combination, they produce comparatively small direct benefit to Industry.

Society of Arts' Lectures on the Exhibition.

The real wants of this country, as shown by the Exhibition of 1851, have been most ably set forth in a series of Lectures recently delivered at the Society of Arts, in pursuance of a suggestion made by His Royal Highness Prince Albert, the President of the Society.* (See Appendix G.) These "Lectures on the Exhibition" point out very clearly the impediment to the development of British Industry that has hitherto existed, owing to the want of means of scientific instruction, both general and specific, in the different branches of Industry.

A few extracts from these Lectures will not be deemed uninteresting, as evincing the strong opinion entertained by some of the most eminent of the scientific and practical men of this country as to the necessity of providing such instruction, if England is to maintain her position as an industrial nation.

Professor Willis uses the following language in his Lecture on "Machines and Tools for Working in Metal, Wood, and other Materials":—

* These Lectures are published by Mr. Bogue, in Fleet Street.

"There are two very desirable objects which I shall proceed to develop, and which, if we take advantage of the interest excited on the subject of manufacturing Science and Art by the Great Exhibition, we may possibly succeed in bringing to bear.

"The first object is to effect a more intimate union and greater confidence between scientific and practical men, by teaching them reciprocally their wants and requirements, their methods and powers, so that the peculiar properties and advantages of each may be made to assist in the perfection of the other.

"The second object is to promote a more universal knowledge amongst mechanics and artisans, of the methods and tools employed in other trades than their own, as well as of those employed in other countries in their own and other trades.

"With respect to the first object, it is no secret that there has always existed an unfortunate boundary-wall or separation between practical and scientific men, a mutual distrust or misunderstanding of their relative values, which has deprived them of many great benefits that they might have mutually derived from each other's pursuits. It is true that in many branches of Science, as in Chemistry, Geology, and Botany, this barrier has to a great extent been broken through; the practical man has found the benefit of scientific generalisations, and the theorist has been compelled to seek the facts upon which his theories are to be based in the mines and manufactories; thus compelling the two classes to work together and learn to understand each other. Still there remains too much of the ancient contempt for 'theory,' and of an overweening and conceited value for 'facts' and 'practice.'

"In no department of science is this carried to a greater extent than between the mathematical and practical mechanics; and yet the mental process by which the parts of a complex machine are contrived and arranged in the brain of the inventor requires the geometrical faculty, as it is called, to a very high extent; that is to say, the power of conceiving mentally the relations of the parts of complex figures in space. So that, in truth, a man gifted by Nature as a mechanist is also qualified as a geometrician; and the untaught inventor, struggling to give form and reality to his conceptions of a new machine, is, in reality, practising imperfectly and unknowingly the very geometrical science he despises, and which, if he had acquired its elements, would at once have shown him how to systematise and arrange his ideas.

"For the system of Mathematics, as it now exists, is the accumulated result of many centuries' work of men thus naturally gifted with the geometrical faculty; and the man who now, directing this mental power to the confection of machines, professes to exercise it 'self-taught,' is acting on the presumption that he alone can begin from the beginning, and dispense with the labours of those men of mighty intellect who worked so long to prepare a system for those who were to come after them. To ignore such labours is a piece of mighty presumption and a pure waste of intellect, which usually brings its own punishment, in the loss of time and imperfection of the result. 'Self-teaching,' in this sense of determined rejection of the previous labours of others, so far from being a source of pride and gratification, is a piece of folly, to use the mildest term, if it might have been avoided; and a lamentable misfortune, if the sufferer has had

no opportunity of knowing what had been already previously effected and prepared by others in the same line.

"Of a piece with this is the case of persons who pride themselves upon executing very difficult works with implements not intended for the purpose, such as elaborate carving, which, we are told, was all done 'with a common penknife.' The experience of carvers of all ages having shown that there are certain forms of chisels and gouges that are proper for this work, a sensible man would certainly not waste his time by using the worst form of a cutting instrument that he could choose for this particular service. So far from admiring, we should pity the vanity and folly of such a display; and the more, if the merit of the work should show a natural aptitude in the workman; for it is certain, that if he has made good work with a bad tool, he would make better with a good one."

Mr. Bazley, President of the Manchester Chamber of Commerce, speaks as follows in his Lecture on "Cotton as an Element of Industry":—

"The contemplation of the difficulties arising from increased competition may be of signal benefit to those especially who desire to maintain and increase the industrial celebrity of Great Britain; for, with the knowledge of approximating and rival skill, the exercise of a cool and sober judgment will prompt the necessity of perfecting mechanical agents, of increased intelligence and attention of the workmen, and on the part of master manufacturers of a complete theoretical and practical acquaintance with the principles on which sound manufacturing operations are founded, together with the most economical and best engineering arrangements for conducting with success the large concerns embarked in manufactures. . . . . The labour of the increasing numbers of the people of this country forms one of the extraordinary raw materials that employment must be provided for; and whether it shall continue to be exerted upon cotton, posterity may know, but we cannot, though in our age and generation we may resolve at least to promulgate sound economical principles, and strive, in providing for the exigencies of our own time, to leave behind us the heir-loom of a national estate unencumbered with impediments to industry, the present and future source of wealth and comfort. . . . . If the labouring classes of the United Kingdom were well educated, their superior attainments would be alike more profitable to their employers, by increased skill, and a nearer approximation to perfection; and to themselves, not only in augmented rewards, but in the knowledge that would promote their general comfort and each other's welfare."

Mr. Henry Forbes, late Mayor of Bradford, again, whose Lecture was on "The Rise, Progress, and Present State of the Worsted, &c., Manufactures of Great Britain," points in the same direction, when he says:—

"Amongst the many advantages of the late Great Exhibition, none was more striking than the opportunity which it afforded of studying the comparative manufacturing capabilities of our own and other countries. Englishmen were taught the useful lesson that we possess no monopoly of inventive genius or practical skill; and that to maintain our position it is indispensable that we

spare no effort and relax no energy. It was in the Department of Design that our English deficiencies were most apparent, and no greater benefit could be rendered to the worsted trade than the introduction of a purer and more cultivated taste, not only amongst the producers, but also the consumers of our fabrics, by an extension and improvement of our plans of Art-Instruction. This was mainly to be effected by indoctrinating the pupil with the true principles of art, and placing before him specimens illustrative of the right application of these principles to the specialties of his own particular manufacture."

Many similar passages from the lectures of the other gentlemen might be cited to the same effect, both showing the importance of no time being lost in commencing a movement for the extension of industrial instruction, and specifying particular instances of the injury sustained from the absence of it. One or two of the latter, taken from lectures recently delivered at the Museum of Practical Geology, are given below.*

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* Mr. Warrington Smythe (Inspector of Mines to the Duchy of Cornwall), in his Introductory Lecture to the Course of Mineralogy and Mining, used the following language :—

"The mining districts of Great Britain are so utterly destitute of the means of Mineralogical education, whether in schools or suitable collections, that it need be no source of wonder to find the most intelligent miner acquainted only with some two or three of the substances which in the routine of his employment have been brought prominently before him, and often neglecting others from ignorance of their nature, or dangerously confounding things which are totally distinct from each other. It is matter of history, that the copper ores of Cornwall were recognised as useful only at a comparatively late date, the miners having concentrated all their attention upon the tin with which that county was so plentifully supplied. More wonderful does it appear, that even at the commencement of the last century, when the yellow ore or pyrites had been long appreciated, the far more valuable redruthite, or sulphide of copper, was thrown as worthless rubbish over the cliffs of St. Just into the Atlantic : and Pryce informs us that "many thousand pounds' worth of the rich black ore, or oxide of copper, was washed into the rivers and discharged into the North Sea from the old Pool mine."*

"These might be considered as the errors of a past age, but we may recollect that they occurred at a time when the value of the same substances was understood in other countries ; and by mere accidental rencontres similar cases are still not unfrequently brought to our notice.

"During a visit, three or four years since, to a mine which was supported chiefly by raising blende, the sulphide of zinc, my attention was attracted by a lump of white mineral lying on the window-sill of the office, a single glance at which was sufficient for recognition ; and I put to the agent a few questions regarding its nature and occurrence. He replied that it was nothing but 'spar,' and that in working a particular part of the lode they had met with many tons of it, which, however, had been all, except this accidentally preserved specimen, irretrievably mixed with the rubbish heaps. The surprise of my informant was not small, when he learned that the so-called 'spar,' confounded by him with quartz, was calamine, an ore containing in its pure state above 60 per cent. of oxide of zinc. Not to leave the same metal and its ores, which put on a great variety of characters, I have known zinc-blende taken for lead-ore, and honoured with the erection of a smelting furnace, when, to the chagrin of the manager, the volatile metal flew away up the chimney, leaving only disappointment and loss behind. Again, from a faint resemblance which some of the varieties bear to certain iron-ores—a resemblance which would at once disappear before accurate observation—a considerable quantity was

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* Pryce, Mineralogia Cornubiensis, 1778.

The Commissioners cannot but be sensible that the sum at their disposal as the Surplus Fund of the Exhibition is altogether inadequate to the complete development and satisfactory execution of a plan of the nature contemplated by them. They feel that if the country requires such a step to be taken as the one

Principles to be followed in disposing of the Surplus.

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bought, not long since, by one of the greatest iron-masters in this country. It was carried to the furnaces, duly mingled with fuel and flux, and after a strenuous effort had been made to get it to yield iron, it all, as the proprietor naïvely remarked, 'went off in smoke.'

"Blunders of this kind are more excusable when made in regard to some of the minerals of comparatively rare occurence. An active agent of my acquaintance, a man of high character, was requested by a couple of his friends, who gave themselves credit for uncommon sagacity, to join them in forming a company to work a deposit of an unusual ore which they had lately found. Already they had referred it, for corroboration of their opinion, to a person at Birmingham styling himself a mineral chemist, whose report set forth that the specimen shown him was, as the others had suspected, an ore of molybdenum, and that it was worth 8*l.* per ton. This was sufficient to induce the agent to join the discoverers in a journey to the place in question, and at the head of a remote valley, embosomed among the rugged hills of Cambria, he was gratified with the view of such a mass of the same substance that it was evident that thousands of tons might be quarried at a mere nominal price. Specimens were broken, the party returned to consider the preliminaries of their adventure, and it was agreed that the mineral corresponded pretty nearly with the description of sulphuret of molybdenum in some book which was at hand. Still, the more cautious manager feared that the prospect was too bright to be real, and without consulting the others, expended a fee in sending for a good analysis to a scientific chemist in London. The result was, that the substance in question proved to be a shining, black, slate-clay, not applicable to any use, except perhaps to make bricks.

"Within a gun-shot of the place where the above-mentioned agent related this anecdote, the appearance of some rather ferruginous slate-rock attracted the attention of a party of credulous speculators, who, believing they had discovered a rich iron-ore, actually built a blast furnace, erected the necessary machinery, and continued for some time to carry out their vain attempt, deluded by the fraudulent practices of the workmen. As might, however, have been predicted, the undertaking soon ended in abandonment and ruin.

"In other mining districts I have known persons, who although possessed of great general intelligence, have collected blue stones (general ores of copper) for cobalt, ignorant of the fact that none of the natural combinations of this valuable metal possess a blue colour.

"The sulphate of baryta has for a few years past borne a certain value for manufacturing purposes: and an instance was brought to my notice, where a ship-load of what was supposed to be this mineral was obtained by surreptitious means, and sent from a distant part of the country to London. But the biter was bit, for his observation was faulty, and his cargo, proving to be calcareous spar, was worthless. It would tire out your patience to enumerate the cases in which mica or iron pyrites have been mistaken for gold. From the anxious country gentleman in our own land, to the disappointed Californian gold-seeker, and to the solemn Turkish Bey mysteriously unwrapping from many a folded rag the specimen of his expected wealth, such victims of mineralogical ignorance are frequently presented to those whose pursuits bring them into a position for advising on similar points.

"But there is another and a wider field far more important than the correction of isolated mistakes, in which mineralogical research has yet to be largely employed, and in which the connexion of this subject with mining is no less grave than intimate. The principles by which the accumulation of ore in lodes or metalliferous veins has been regulated are to this day so enveloped in mystery, that the prosecution of mining enterprises is almost as much a matter of chance as it was with our forefathers three centuries ago."

Professor Edward Forbes, in a similar introductory lecture on the "Relations of Natural History to Geology and the Arts," gives the following striking illustrations, to the same effect:—

"Not long ago considerable funds were spent in a district in the west, in a useless search

which their inquiries have led them to consider desirable, the active co-operation of the State, as well as of the public at large, will be necessary in order to obtain all the benefits which may be hoped for from it. The Commissioners, however, feel it their duty to deal with the funds in their hands in such a manner as may ensure the greatest amount of advantage being derived from the mode of their application; and they consider that in no manner could this be ensured so well as by carefully preparing the basis and framework of a large and comprehensive plan and securing facilities for its execution, leaving it to the various interests concerned to give substance to it, whilst the perfect development of the system must be left to the progressive action of time, commencing with the wants at present manifested, and extending it as those wants become greater and find expression on the part of the public.

Difficulties at present existing in this country.

In investigating the causes which have led to the deficiency in England of larger institutions of the character alluded to, and the reasons why the great

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for coal. The adventurers, ignorant of geology, had set to work in dark Silurian shales, among the oldest of stratified rocks, and far beneath our carboniferous strata. Their mineral aspect, however, resembled that of certain coal-shales with which the miners were familiar. Had they possessed even a slight acquaintance with organic remains, they would have abandoned their profitless experiment at the very commencement; for the shales in which they were working were charged with graptolites, extinct zoophytes, which do not range higher than the lowest fossiliferous group, and the presence of which indicated the true character of the strata beyond question. The fossils did not escape the notice of the miners. They collected them, and grew the more confirmed in their mistake; for, unacquainted with the differences, they mistook them for coal plants. They might have bored through the earth's centre without coming to the treasure they sought; their only chance of reaching it was by perforating quite to the antipodes.

"In a second example I was myself personally concerned. Some years ago, when as yet but a student attending the geological and mineralogical lectures of Professor Jameson, I opposed by letter in a provincial journal, a mistaken enterprise upon which much money was unfortunately spent. The object of it was to sink through the old red sandstone, with the hope of reaching coal, in a district where such a search was hopeless. The parties engaged were confirmed in their intentions by the advice of practical coal-miners well acquainted with the collieries of the north of England. These men argued, that since there was limestone and sandstone similar to those rocks associated with coal, and overlying it, in the districts where they had worked, therefore the strata were the same, and coal should be found. I pointed out, chiefly from the evidence of the fossils contained in the limestone overlying the sandstone, that the rocks on which they proposed to operate were only like to, but not identical with, those to which they were compared. I told them,—the warning was proffered in vain,—that they were throwing away their money. One of the shareholders, an intelligent man and a reader of elementary works on geology, replied to my objections by attempting to meet them on scientific grounds. In some old-fashioned books it used to be asserted, that shells of the genus *cardium*,—in plainer language, cockle-shells,—when found fossil, are characteristic of tertiary strata. "Now," wrote my opponent, "cockles abound in the limestone in question, therefore it is tertiary, and the carboniferous strata must lie beneath." He had mistaken certain forms of *terebratula*, shells of a very different order, for cockles; a very unfortunate mistake, for the error was persisted in, and much good gold turned into irredeemable dust."

Dr. Playfair mentions the following instance as having occurred to himself within the present year:—"A large smelter of lead brought to me a specimen of a heavy white mineral, which occurs in considerable quantity in his mines, and which he laid aside as sulphate of barytes, in the hope that he might sell it for the purpose of adulterating white lead. He was much astonished when I told him that this white mineral was in fact white lead, much richer in the metal than the black ore which he was accustomed to smelt."

amount of private exertion and of State endowment already mentioned has not operated with all the advantage that might have been looked for, we have found two, which have more especially attracted our notice: the first being the want of that harmony of system which would admit of an economic and combined action of the forces already in existence towards a common end; and the second, the want of actual space for their development in this overcrowded metropolis, a difficulty which is daily increasing, and which is peculiarly great in this country, in consequence of the nature of the tenure on which ground is in many cases held, and the terms on which leases are granted, whereby the most serious inconvenience to existing institutions and societies is frequently caused. The following instances of the latter of these difficulties, namely, the want of actual space, have, amongst many others, come to the knowledge of the Commissioners.

Instances of want of space.

Royal Society.

With regard to the *Royal Society*, they understand that strong representations were recently made by that body to Her Majesty's Government for additional accommodation. The rooms occupied by the Society in Somerset House, and which are much wanted for public offices, are quite inadequate to hold the valuable library at present possessed by it, a difficulty which must be constantly increasing. Even now it is found impossible to arrange the Admiralty Charts belonging to it, or books of a large size, thus preventing their being made available for reference by the Fellows. The whole of the income of the Society, which averages about 2,700*l.* per annum, is expended in scientific purposes; and, considering the good which it has done, and still continues to do, it feels that it has strong claims upon the country for increased accommodation.*

School of Mines.

The *School of Mines*, in connexion with the Museum of Practical Geology, was opened on the 6th of November last year. The chemical laboratory attached to the school, and which is calculated to accommodate only twenty students (although thirty-three are now actually at work in it), was immediately filled, and a warehouse has been temporarily fitted up as a laboratory, in order to furnish increased accommodation. Sir H. De la Beche's report, accompanying the estimates for the year 1852-53, after stating that it had become necessary to refuse additional pupils, proceeds as follows:—

"The want of accommodation is a circumstance to be regretted, as Practical Chemistry in the laboratory is very important to the students at the school. The limits in this direction must prevent that considerable increase of students next session which, from the many applications which have been made, there is every reason to believe would take place."

When it is borne in mind that, in an institution like this, the size of the laboratory is the real gauge of its usefulness, the unfortunate effect of such a state of things is too obvious to require comment.

School of Design.

In the case of the *School of Design*, representations on the subject of the want of space in the apartments at Somerset House, to which it was confined for many

* In addition to the above sum, the Society has of late received 1,000*l.* annually from Government, to be applied by it to special scientific purposes.

years, have been frequently brought under the notice of the Government, and the same point was strongly urged in the Report of the House of Commons' Committee of 1849 respecting the school. It had even been necessary to divide the school, and place the male and female branches of it in different parts of London. In order to provide a temporary remedy for the inconvenience caused by this want of space, Her Majesty has, of her own gracious motion, been pleased to authorize, for a limited time, the use of certain apartments in Marlborough House for the purposes of the department; but even these are so restricted in their size and number, that the Superintendents have been obliged to avail themselves of the domestic offices, &c.

College of Chemistry.

The *College of Chemistry*, which was established in 1845, has been greatly impeded in its development by its inability to obtain the necessary ground for building a lecture-room.

National Gallery.

The very great want of accommodation in the present *National Gallery*—and the absolute necessity of obtaining more space, and putting an end to the anomaly of such a collection of pictures as that possessed by the nation being obliged to be exhibited in separate buildings at some distance from each other, in neither of which can the pictures be properly displayed, in consequence of their number, considered in reference to the size of the rooms—are too well known to render it necessary to do more than refer to them.

Society of Arts.

The *Society of Arts* have applied to the Commission for a portion of the surplus in order to aid its Building Committee to find more adequate accommodation for its wants, the absence of which accommodation at present prevents it from entering upon a more enlarged sphere of usefulness.

Collection of Mediæval Art.

It will be remembered that, on the occasion of the rebuilding of the Houses of Parliament, the Government formed a collection of casts, at a great expense, for the use of the works. One portion of this collection, consisting of 3,489 specimens of enrichment taken from the best examples in this as well as in foreign countries, for the guidance, as to style, of the carvers employed in the decorative portion of the building, is at present partly at the Government Works at Thames Bank and partly at the New Houses of Parliament, but is intended to form a portion of a National Museum of Mediæval Art, when proper accommodation can be provided. The remainder of the collection (the cost of which has been about 7,000*l.*), consisting of 3,282 casts from models prepared for the stone and wood carvings already executed at the building, is deposited in the basement of the workshops at Thames Bank, where the casts cannot be properly displayed.

Map Office.

The absence of a *Map Office* in London (where naval charts might also be exhibited), and the want of proper accommodation for an object which would appear so indispensable for a maritime and commercial country, may also be mentioned. The *Geographical Society* has made repeated applications to Government for rooms where it might be enabled to display its collection of maps better than at present.

As a further illustration of the want of space to which they are now alluding, the Commissioners would refer to the case of the *Royal Academy*, where the greatest inconvenience is caused by its being necessary to close most of the schools during the four summer months, when the light is best adapted to the study of drawing and painting, solely because the rooms are required for the purposes of the annual exhibition. A memorial to Her Majesty on the subject, from the President and Council of the Academy, in which the practical inconveniences of the want of sufficient accommodation are clearly set forth, is appended. (See Appendix H.) The interruption of the tuition, by giving desultory habits of study to the pupils, is found to be productive of much injury. Royal Academy.

But no case affords such an illustration of the lamentable want of space now referred to as that of the greatest national institution in this country, the *British Museum*, in which there is scarcely a single department where extreme practical inconvenience is not sustained in consequence, while the impediment thereby opposed to the advancement of science is self-evident. It will suffice to mention the following examples of overcrowding in the Museum :— British Museum.

The Department of *Printed Books*, which now contains about 480,000 volumes, has more than doubled in extent since 1836, the increase having been at the rate of 16,000 volumes a-year ; and at least an equal rate of increase in future years must be looked for, and a due provision for it ought, as a matter of course, to be made. Almost the whole of the space, however, that can possibly be applied to the purposes of the department is now occupied, and the inevitable consequence must be, that unless additional accommodation be provided, books received in future will be unavailable for any useful purpose, and it appears that even already the collection is falling into arrears. It is the opinion of the head of the department, that, in order to render the Library worthy of its name and of the country, provision ought to be made for its being doubled in the next 30 years, and he most strongly urges the necessity of no time whatever being lost in providing additional accommodation in order to enable the collection of printed books to keep pace with the demands of the public.

It is also evident, that in proportion to the increase of the Library must be the increase of accommodation to readers ; but, even at present, the Reading-rooms of the Museum are far too small for the number of students making use of them, who are exposed to great discomfort in pursuing their researches.

A Minute of the Trustees of the 5th June last, states that "the want of accommodation for printed books and for readers is daily more and more felt, and will, in a few months, be a most serious evil," and proceeds to urge that immediate steps should be taken for affording increased accommodation.

In the Department of *Antiquities*, the amount of available space is most inadequate for the display of the present collection, and it has been found necessary to deposit all the later Roman Works of Art, the Sepulchral Monuments, Inscriptions, the Etruscan, Mexican, and Indian Antiquities, &c., in the basement or cellars, the access to which is inconvenient and the light defective. The head of the Department reports that the present possessions of the Museum are, in almost every room, crowded together and piled over each other like goods in a warehouse,

and that it is almost impossible to attempt correct classification or satisfactory arrangement. He gives particular instances of want of space in the case of the Egyptian, Assyrian, Lycian, and other collections, the tessellated pavements and terra-cottas (now packed in boxes), the Ethnographical Collections, &c. &c.; and states generally, that "Europe cannot show any building so ill adapted for its intended purpose as the British Museum."

The Department of *Prints and Drawings*, which increases its collection at the rate of 2300 a year, is confined to one room, which is very little larger than the one occupied by it fifteen years ago. It has been found necessary to appropriate to the Department of Antiquities, for the exhibition of the Assyrian Marbles, the gallery that had been intended for the display of prints and drawings,—the want of which is greatly felt, but must now remain unsatisfied.

As respects the Department of *Natural History*, and its three divisions of *Mineralogy*, *Zoology*, and *Botany*, the evil is as great as in any other department. In the *Mineralogical* section, the keeper reports that all the objects added to the different collections are placed promiscuously, partly with some show of arrangement, partly without any attempt at it, in all such vacant portions of one of the galleries as could afford temporary accommodation for their preservation; and he states that although the space devoted to the division under his charge has been increased as far as possible, the necessity of extending the locality assigned to it on a larger scale cannot for a moment be doubted.

In the division of *Zoology*, it appears that the collection has increased tenfold since 1836, while the space assigned to it has only been increased threefold. Nearly one-half of the additional specimens are kept in rooms on the basement, which are only accessible to the public on special permission. At least 20,000 square feet additional are required to render the present collection accessible. The *Osteological* collection, or collection of skeletons of vertebrated animals, by far the largest and most complete ever formed in this country, and the exhibition of which is of the greatest importance to the progress of zoological science, is now deposited in the cellars, where the collection of animals in spirits is also placed. The chief of the division strongly urges the necessity of space being provided for the exhibition of these two collections; as, until they are exhibited to the public, and arranged in the same order as the stuffed animals, the students visiting the Museum are deprived of half the assistance in their studies which the collections might, and ought to afford them.

The progressive extension of the *Botanical* division, to which more than 50,000 specimens have been added since 1836, has caused the space allotted to it (which had previously been nearly doubled) to be already filled, and it will soon be necessary to remove part of the collection to the basement, where the engraved copperplates illustrative of the division are at present deposited.

It is thus evident that, although the Trustees of the British Museum have availed themselves of every resource which the existing buildings are capable of affording, and have endeavoured in every way to overcome the difficulties arising from want of space, they have found it impossible, much as the Museum has been enlarged of late years, to make the necessary arrangements for

properly displaying even the present collections, without taking into account the necessity of providing for future increase. It is estimated by them that an outlay of 250,000*l.* would be required in order to provide adequate accommodation for the rapidly increasing Library of the Museum, and the other collections above mentioned.

Besides these and many other instances which might be cited, there are objects of much public utility which it has been found impossible to carry out on account of the difficulty of procuring space. In the recent discussions on the subject of the Patent Laws, for instance, constant reference was made to the want of a building in which models and plans of inventions might be deposited for the advantage of the inventor and the information of the Public.

Having regard, then, to the different questions which we have now briefly touched upon, we beg to represent that it appears to us that the two things to be aimed at, as the preceding observations will serve to show, are the adoption of a *system*, and the securing of a *locality* where that system may be developed. We feel that we are best discharging the duties intrusted to us by Her Majesty, by submitting for consideration and discussion on the part of the public such a system, and by ourselves providing such a locality, bearing in mind that the filling up of the plan that may be adopted must be left to the wants expressed, to the interest felt by the public at large, and to the voluntary efforts of institutions, societies, and individuals, aided by the efforts of Government to develop more fully the institutions already founded by it, and which are so much appreciated by the public.

General Classification pursued in considering system.

In considering a system comprehensive enough in its general features to embrace the extensive ramifications of Industry, we have thought it best to adopt the classification of the Exhibition so far as regards its great divisions. This classification was found convenient in practice, and it is therefore to be presumed that it must have been founded on sound philosophic principles. The four divisions comprehended (1) the *Raw Materials* used for production; (2) the *Machinery* employed in rendering them fit for useful purposes; (3) the Products themselves (*Manufactures*) in the state in which they are used; and (4) the *Fine Arts* employed in adorning them. It will be convenient to consider the general subject under these heads.

Division I.—RAW MATERIALS.

Division I. Raw Materials.

When we examine into institutions raised and supported in consequence of a public demand, the elements of much that is useful are found, though from want of combination and united effort, the full amount of good has not yet been obtained from their action. The natural subdivisions of raw materials into the mineral, vegetable, and animal kingdoms, have found expression more or less perfectly in three public institutions, to which we will now proceed to refer.

(a) *The Mineral Kingdom.*

(a) Mineral Kingdom.

This department is represented by the Government Museum of Practical Geology, and its associated School of Mines. This institution has arisen and been developed by various circumstances to which it is only possible briefly to refer. The Geological Survey, formerly under the Ordnance Department, had ample opportunities of collecting specimens illustrative of the industry connected with our raw mineral resources, estimated to produce annually 24,000,000*l.* sterling. In 1835 a small house was devoted by Government to the retention of specimens thus collected. The value of these, imperfect and limited as they were, was recognised by the Public, and numerous contributions from the mining and manufacturing interests soon enlarged the collection to such an extent, that after the Museum and Geological Survey were united in one department (in 1845), the then Office of Woods and Forests erected the large building in Piccadilly in which the museum is now displayed. From the first establishment of the Institution, the Government, by the advice of Sir H. De la Beche, to whose unwearied energy the importance of the establishment must be in a great measure ascribed, contemplated using it for instructional purposes, but it was found impossible to execute this intention until it was located in more commodious premises. In the meantime, however, important memorials were presented from the chief mining districts, praying that the institution should be converted into a Mining College; and the Government, acting upon this request, instituted last year in connexion with it, and by its own officers already attached to it by other duties, a department for conveying instruction, under the name of the "Government School of Mines and of Science applied to the Arts." The museum, thus enlarged in its sphere of usefulness, was opened by His Royal Highness Prince Albert only a few days after the opening of the Exhibition, but so great has been the demand for the industrial instruction which it professes to give, that its accommodation is already insufficient, as we have shown in a previous part of this Report. This Museum and College was attached to the Office of Woods and Forests, when the latter had charge of the Government mines, but in the recent changes in that department the institution has been retained by the Office of Works, with the duties of which it would appear to have little connexion. The obvious tendency of this museum has been of late years to extend in the direction of Mineral manufactures, and its collections represent these in certain cases in a very complete manner. Its natural objects would therefore appear to be more in unison with the objects of the Board of Trade than with those of the department to which it is at this moment attached.*

(b) *The Vegetable Kingdom.*

(b) Vegetable Kingdom.

In addition to the exertions of Bodies like the Horticultural and Botanic Societies (as shown in their gardens and the exhibitions of flowers held by them), the public wants in this direction have begun to find expression at Kew, under the zealous superintendence of Sir W. Hooker. A museum, commenced in 1848, and yet in its infancy, comprehends for the vegetable kingdom collections similar to those embraced in the Museum of Practical Geology for the mineral

* His Royal Highness the Prince of Wales, as Duke of Cornwall, has instituted two exhibitions of 30*l.* each, in connexion with the instructional part of this institution.

kingdom. Its tendency, in increasing the collection, has also been in the direction of manufacturing industry, for, in the words of the Director, "it is intended to contain all (save some of the most trifling and familiar) *vegetable* products, whether in the state of raw material, or as prepared by the art and ingenuity of man; all kinds of useful and ornamental woods, dye-stuffs, drugs, gums, resins, medicines, fibres, &c., &c.; whatever, in short, is serviceable in the arts, manufactures, medicine, or domestic economy." The last report of Sir W. Hooker, accompanying the estimates for the year 1852-53, shows the increasing importance of this institution, for he says—

"The Museum of Vegetable Products has increased beyond all expectation, and at a most trifling cost to the country; for the advantages it affords in the way of information and instruction are now so obvious, that many contributors who desire to make known various vegetable products and preparations, have sent specimens to this museum, and donations have accumulated, we may say daily, for the last six months. All the available space in the building is now devoted to the museum, and fitted up with glass cases, which are rapidly filling. For many valuable contributions we are indebted to the Great Exhibition. They consist of vegetable products, raw and in various stages of manipulation, and manufactures of vegetable substances from all parts of the world. The exhibitors have manifested great interest in the museum, and have generously aided its collections. The Secretary of State for the Colonies has also placed at our disposal many vegetable products from the distant possessions of the Crown. I have likewise, with the sanction of the Chief Commissioner of Works, purchased an interesting collection (correctly named) of all the woods of Tuscany from the Tuscan Commissioners; this country yields much of the valuable timber for our navy. Messrs. Peter Lawson and Sons, of Edinburgh, have presented to the museum their collection of Scottish agricultural, horticultural, and arboricultural products. This forms in itself an important addition to our stores. The names of contributors stand attached to their respective donations, which need only be inspected to attest the worth and extent of the gifts, and the liberality of the givers. And when the guide-book to the museum is printed, which has been necessarily delayed in consequence of the great recent additions, a yet wider publicity will follow. Such contributions, together with the collections received during this year from Dr. Hooker's Travels in Eastern India and the Himalaya, will more than fill the present structure."

Dr. Hooker has received a temporary appointment from Government, for the purpose of arranging the specimens alluded to in the above extract, and as the museum will be overcrowded, it will be necessary to find much increased accommodation.

(c) *The Animal Kingdom.*

(c) Animal Kingdom

This branch is less perfectly represented, for the purposes of instruction, than either the Mineral or Vegetable Kingdom. It is true that the Zoological Society in their gardens represent it efficiently as far as regards living animals, but the products so much used in manufactures have not yet found adequate representa-

tion in any museum. Many illustrative specimens in this department have been given to the trade collection formed by the Commissioners; and there is little doubt that the Public would soon supply the deficiency, were opportunities offered for the useful display of specimens.

But neither in the Vegetable nor Animal Department do we find those means of instruction to which we alluded under the Mineral Kingdom. There exists no institution combining the natural study of Vegetable and Animal Products with the study of Chemistry, which has of late years so materially advanced our knowledge of vegetable and animal life. An isolated establishment, the "College of Chemistry," instituted in 1845 under the presidency of His Royal Highness Prince Albert (the present professor being Dr. Hofmann), and which has devoted its researches in a great degree to Organic Chemistry, does indeed exist; but its entire absence of connexion with other institutions, and its necessary limitation to a single science which, though an important one, yet constitutes only one branch of knowledge, have prevented it from having that amount of influence on Manufacturing Industry which its projectors anticipated. It is believed that its resources might be more usefully applied if it were put in connexion with those branches of the Organic Kingdom which are so closely allied with the nature of its investigations.

General Remarks on Division I.

We have thus drawn attention to the different institutions which may be generally comprised under the head of Raw Materials (as chiefly dealing with them and with the investigation of the processes used for adapting them to the purposes of Industry), as we see in them a public recognition of the importance of instruction in this direction. We find, however, that they have arisen in the strong convictions of those who profess the special branches of knowledge to which they refer, and that much of their importance to Industry is lost by their total want of connexion even as regards locality, and the impossibility, therefore, of using them in a course of systematic instruction. Although for convenience, separated in classification, they yet intimately depend on each other, and the knowledge derived from all becomes one in its application to industry. Thus in textile printing, an acquaintance with mineral mordants, of animal and vegetable colours, of animal and vegetable fibres, can now only be obtained in establishments widely apart and not working together for one common end. These means of education, which in this country are fragmentary, dissevered, and far from complete, are in other parts of Europe associated into one common system, and produce those striking applications to industry which were presented to us in the recent Exhibition.

Such institutions, embracing instruction in the principles of Science connected with the three kingdoms of nature, might be made available, with suitable additions, for the promotion of Agriculture, and thus aid the advance of an art which has recently made such marked progress.

Division II.—MACHINERY.

Division II. Machinery.

The Department of Machinery is not at present represented by any special metropolitan institution designed for instruction. Nevertheless, one of those

isolated efforts arising from the convictions of persons interested in the special industry has shown a public recognition of the want. For several years the College of Civil Engineers at Putney included instruction in this branch of knowledge. This institution arose at a time when railways sprang into sudden existence, and called for more engineering knowledge than was generally diffused through the country. For some years it was very successful as to the number of pupils, but after a time it became apparent that its scope was too limited, and that there was not sufficient outlet for its students; other circumstances of a pecuniary and private character intervened, and the college was discontinued in 1851. The deduction to be obtained from this is not that the institution did not supply a want in instruction, but rather that special efforts for a limited object may fail, which had they been part of a scheme embracing a larger field of action would probably have been eminently successful. A department of King's College devoted to Civil Engineering, and having workshops attached to it, is now in successful operation, and partly supplies the instruction required in this division. The Institution of Mechanical Engineers in Birmingham arose in a great measure from a feeling amongst those who superintended the mechanical department of railways, that it had become exceedingly desirable to assimilate the arrangements and designs of the various railway companies, whose want of uniformity was daily productive of much inconvenience. It was evident to every one connected with these works that this object could only be obtained by freely discussing the merits of the different systems pursued in different parts of the country in a society established for this and similar purposes. Although the institution has only been recently established, unequivocal benefit has already been derived from it, in consequence of the heads of the locomotive and carriage departments having been brought together so as to interchange their ideas, and to report from time to time the actual results of their daily experience; thus their proceedings become a record of most valuable facts for the use of the practical mechanic.

The admirable effects produced by well-arranged collections of Models of Machinery, and especially of new inventions, are shown by the public importance attached to the "Conservatoire des Arts et Métiers" in Paris, and similar institutions in other parts of Europe. The great attention paid by the Public to the department of the Exhibition devoted to Machinery indicated how eagerly such facilities for acquiring knowledge were used. Further evidence of the fact is seen in the desire, already alluded to, that was expressed by inventors in the late discussions on the Patent Laws, to obtain a place where models of recent inventions could be deposited. It is well known that there are numerous valuable models existing in this country which it would require little effort to obtain if suitable accommodation could be provided for their display and useful illustration. If means were offered for exhibiting and testing new machines under scientific superintendence, we have reason, from the experience of the Exhibition, to believe that they would be largely taken advantage of, and it cannot be doubted that such means, used for the purposes of instruction and with the co-operation of our eminent civil engineers and of the scientific societies, would soon give a new impetus to Invention. It has already been shown in a former part of this Report, that a systematic training in the principles of

Machinery is a great desideratum in this country. (See the extract from Professor Willis's Lecture previously quoted.)

Division III.—MANUFACTURES.

Division III. Manufactures.

All the technicalities of manufactures cannot be well taught in an institution devoted to instruction, but the principles on which they depend form an important object of that instruction. These principles are, however, involved, and gradually develop themselves from the study of raw materials, the processes used in their adaptation, and the machinery employed in their conversion to useful purposes. Manufactures, therefore, so far as they form the subject of scientific instruction, naturally grow out of, and indeed form a part of institutions such as those described in the preceding sections. But it would be necessary that the general tendency which such institutions have exhibited, in accordance with a public demand imperfectly expressed, to extend themselves in the direction of manufactures, should be systematized and be made of an importance adequate to the acknowledged wants of industry. The Society of Arts seems originally to have intended to supply this deficiency, for after quoting several instances, Professor Solly, the Vice-Chairman of its Council (and now Secretary to the Society), makes the following remarks in his Lecture "on the Vegetable Substances used in the Arts and Manufactures in relation to Commerce generally" (one of the series delivered in pursuance of His Royal Highness Prince Albert's suggestion):—

"These are, however, but a few out of the many similar facts I might mention; they show plainly, that had the original objects for which the Society was established been strictly adhered to, and had its means enlarged in proportion to its utility, we should now have a most valuable record of the progress of human industry during the last hundred years, in fact a great industrial museum of the whole world, not a mere magazine or storehouse in which natural productions and ingenious contrivances are piled up in endless confusion, where they may remain buried for ages; but a practical, useful, and well-arranged series, denoting past progress, and leading to future improvement; a place of reference, in which useful knowledge of all sorts would be accessible to every one, and at all times available for purposes of instruction."

Trade Collection.

The Society of Arts by its recent special exhibitions, which prepared the way for and led directly to the Great Exhibition of 1851, has been again moving in this direction; and Professor Solly, in the same lecture, suggests the formation of a Trade Museum, in which the manufactures should be fully represented, as well as the materials which give origin to them.*

* "The Great Exhibition has strongly shown the want of such a collection in England, and I feel that it is not foreign to the objects contemplated in these Lectures, if, in conclusion, I should ask my brother members, why should not we, even now, commence the formation of such a collection; why should not the Society of Arts undertake that which would be so great a public benefit?

"In throwing out this suggestion, I would remind you, not only that the Society of Arts possesses greater facilities than any other Society for collecting a great Trade Museum, but

The Trade Museum so liberally presented by various exhibitors to the Commissioners, and the numerous promises of further contributions, added to the collection already possessed by the Society of Arts, and what we have reason to hope might be secured from its active co-operation, would form a nucleus of a very important character for a Museum of Manufactures worthy of this industrial country. Museums similar to that proposed exist in other countries, and are of much use by enabling manufacturers to compare the respective excellences of production. A memorial (see Appendix I) signed by very influential merchants and others interested in the commerce of London, has been presented to the Commissioners, urging the desirableness of a trade collection in which commercial specimens, with all necessary information as to prices, production, &c., might be placed. Such a collection would in all probability be self-supporting, as its commercial and exchange advantages are obvious. In the Lecture which we have just quoted, it is said:—"It may be taken as a pretty well ascertained fact, that only those manufactures are really in a progressive state of which the producer of the raw material and the manufacturing consumer are in more or less direct communication, and where there is a mutual knowledge of the capabilities of the one and the requirements of the other." A trade collection, which in its nature must be fluctuating in illustration, the specimens not being permanent, would be advantageous in connexion with permanent specimens of manufactures, and both might be usefully employed in the instruction of those who are to instil into industry that knowledge of Science which is so important to keep it in advance of the intellectual competition among nations. Such museums, of which the scattered elements already exist abundantly in the Metropolis, can only be of enlarged public utility when combined with instruction, the admirable effects of this combination being already seen in many other parts of Europe.*

Division IV.—FINE ARTS.

Division IV. Fine Arts.

This division, as compared with the three preceding ones, is already represented extensively in the Metropolis, though still very inadequately, when contrasted with other capitals. It may suffice to cite the National Gallery, the Galleries of Sculpture in the British Museum, the Royal Academy, and the Department of Practical Art (including the Schools of Design). Of these the first two have for their object

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also that the many valuable and interesting specimens already in the drawers and cabinets of our model-room, constitute of themselves alone a collection of the very greatest practical importance.

"With those who say we need an enlarged and comprehensive system of National Education I agree heart and soul; but I would even go further—I say, let us have the means of teaching the schoolmaster as well as the scholar; let us, by collecting sound facts and useful information, obtain those means of instruction in applied science which are at present wholly wanting."

* In Germany, Schools of Commerce have long been established, either separately or in connexion with the Polytechnic Institutions. The subjects usually taught at these schools are—the principles of commercial science, commercial law, commercial mathematics and algebra, a knowledge of raw materials and products, geography, trade, &c., and book-keeping, style, and composition. They are generally attended by young men previous to their entering the counting-house of the merchant.

the illustration of Art viewed in the abstract; the Royal Academy has for its object instruction in the higher branches of Art; and the last named, the special application of Art to industrial purposes.

Painting, National Gallery, &c.

The objects and history of the National Gallery are so well known, that it cannot be necessary to describe them. It is, however, universally allowed to be far from being worthy either of this country, or of the purposes to which it is devoted:—the confined space at its disposal depriving the Public of many advantages which it has a right to expect from the Institution, and also tending to prevent individual contributions and bequests, which, there is every reason to believe, would otherwise be largely made to it.

It is of the greatest importance to collect, while it is possible, good specimens of the various schools, including the earliest masters, so as to enable the spectator to trace the gradual progress in the art of painting generally, as well as the gradual development of the qualities for which particular schools have been distinguished. To render such a series instructive, much would depend on arrangement; but in the present National Gallery, even if the materials existed, an arrangement with a view to schools and the progress of Art is impracticable from want of room. As fresh additions are made, this want of order necessarily increases, so that the collection rather resembles a warehouse of pictures than an illustrative gallery. To the advanced connoisseur and artist this is perhaps of less consequence; but for students and the public generally, it must be regarded as defeating in a great measure the objects of a National Gallery.

The difficulties, arising from want of space, which at the present moment interfere with the complete and satisfactory development of sound instruction in the higher branches of Art, have already been noticed in the instance of the Royal Academy. Such difficulties are not confined to the case of Painting, but are applicable in a still greater degree to the sister Arts; and the impediments referred to cannot but be felt, when it becomes a question of the practical application of the Arts to the Industrial purposes of Manufacture, the special object for which the School of Design was originally established.

School of Design.

This school, from the period of its opening in 1837 to the present time, has had to encounter the difficulties which arise from a deficiency in that early elementary knowledge of Drawing requisite for making satisfactory progress in Ornamental Art. The consequence has been, that this elementary instruction has necessarily formed the chief business of the school and of its branches, and has so far prevented it from producing all the beneficial effects which would have ensued had the means of imparting that instruction existed elsewhere.

Nevertheless, the desire felt on the part of the Public to take advantage of the benefits held out by the school has been so strong, that altogether not less than 20,000 pupils have passed through the Central and Provincial Schools; and the number at present attending them is upwards of 3,000. The sum annually voted by Parliament for their support has gradually increased from 500*l.*, its amount when the school was first established, to the sum of 17,920*l.*, as shown in the estimates for the year 1852-53. (See Appendix F.)

The necessity for reorganizing the system until recently in force, and of making the School of Design of more extended utility has, within the last few months, led to the establishment by the Government of a Department of Practical

Art, under the superintendence of Mr. Cole and Mr. Redgrave, R. A., the former of whom so materially aided the Commissioners in bringing the Exhibition to its successful issue, by his zealous and indefatigable exertions as a member of their Executive Committee, while the latter prepared for them a valuable Report on Design, to accompany the Jury Reports, at the time when he was a member of the "Fine Arts" Jury.

In a letter recently addressed to the President of the Board of Trade by those gentlemen, they have submitted an outline of the principles which they conceive should be adopted in order to promote its satisfactory development. They recommend that with the view of carrying out the great object of Schools of Design, viz., "the study of the various processes of Manufacture, and the practice of Design for Individual branches of industry," and "the *practice* of the various branches of Decorative Art," the student should have the means of consulting fine examples of what has already been accomplished in the special department in which he seeks to be proficient. They say, for instance, that

"An educated designer for Ceramic Manufacture should at least have an adequate knowledge of what Japan, Meissen, Sèvres, and even Chelsea, have already done, and should aim to acquire a power of execution as high as that which his predecessors have possessed. He should be instructed also in the principles which guided them to excellence, and taught to avoid the faults which marred the perfection of their labours. In like manner, the properly-educated designer for Printed and Woven fabrics ought to be practically familiar with the early Chintzes of India, as well as with the best specimens of work now produced at Paris, Mulhausen, Crayford, or Accrington.

"Classes of students should be formed for the actual practice and study of the specialties of manufacture, and for acquiring a knowledge of the general principles by which the ornamental design for such manufactures must be regulated."

The letter in question also contains the following passages :—

"The purchases of Indian and other ornamental works from the late Exhibition will be of the greatest value in developing the higher kind of instruction thus indicated, both in London and the country.

"In this (the more advanced) as in the elementary division of the department, it may be expected that the general public will derive considerable benefit. Whilst the student is acquiring skill by practice, both the producer and the consumer will have increased means of judging of the success of the student's efforts; and after a time it may be expected that all classes will become as willing to receive instruction in Art as they are in History, Chemistry, or Geology."

It was also recommended that lectures and demonstrations of the principles of design, exemplified by the articles comprised in the collection possessed by the department, should be given as soon as arrangements could be made for the purpose. As has been already mentioned, a limited amount of space has been *temporarily* obtained at Marlborough House by the gracious favour of Her Majesty. The collection which is now displayed there forms a very valuable nucleus for a larger one, and supplies a want which had seriously impeded the progress of the Schools of Design.

Their past history had proved that the teaching of principles without the means

of demonstrating their truth by example, had been only an imperfect instruction, and it had long been felt that a collection of suitable examples was indispensable no less to the teacher than to the pupil.

The Public already possess numerous articles by means of which a proper collection might be formed. In addition to the articles at Marlborough House, the British Museum contains specimens of Etruscan Pottery, carvings by Albert Durer, designs for goldsmiths' work by Holbein, gems, &c., while the Museum of Practical Geology possesses examples of Ceramic and Glass manufactures, at the same time that the collection belonging to the Commissioners itself includes many valuable specimens illustrative of this department.

By a union in one locality of these different means of instruction, with the advantage of not being far from the National Gallery, the public taste would be educated in the most efficient way, and the history of Art, as applied to useful purposes, practically exemplified.

Such a collection, historically arranged, and showing the progress of different manufactures from ancient times to the present day, might either be formed by the Government and exhibited by them, or else made by the Commissioners on a self-supporting plan, upon condition of their making all the materials deposited in it serviceable for lecturing on and copying from in the adjoining School of Practical Art.

Architecture.

Before concluding these observations on the subject of the Fine Arts, it is necessary to notice the important subdivision of *Architecture*. Of all the higher branches of Art, it is the one which may be said to require the most varied degree of instruction, and to be connected with the greatest number of branches of practical Science. An acquaintance with the properties of Raw Materials, a knowledge of Physics, of Chemistry, of Manufactures, are alike indispensable to its correct appreciation ; but although this truth has long been acknowledged and acted upon in other countries, it has not been so with us to the extent that might be desired.

The necessity of a more perfect system of Artistic Instruction, as already shown by us in the case of Painting, is equally a necessity in this instance ; and we may observe that the collection of casts made by Government on the occasion of the building of the new Houses of Parliament, and ultimately destined, as we have mentioned, for a National Museum of Mediæval Art, would, if only as a nucleus, form a most valuable object of study in this department.

Juxta position of Societies already contemplated.

The Commissioners understand that in 1847, the Philosophical Club, a body consisting of eminent Fellows of the Royal Society, instituted inquiries through those of its members who also were members of other learned Societies, as to how far it would be agreeable to the latter to aid in procuring juxta-position of the Societies of the Metropolis. The replies received from the different Societies were on the whole favourable, but from the difficulty of obtaining a site, the further consideration of the subject was postponed. During the past year, however, the possibility of obtaining this desirable end has again been brought before the different learned bodies, and in some instances formal resolutions in its favour have been passed by the Councils ; while in others, the opinions of the leading members have been found to support the views entertained. It has been

urged that if this juxta-position were effected, much of the pecuniary resources, now expended in rent, &c., would be used for the direct promotion of scientific research; and, the Libraries being rendered available for mutual and even general reference, the great inconvenience would be avoided of having to refer to specimens and books in the collections of Societies widely apart from each other, while the concentration of the Societies would direct a greater amount of public attention to their endeavours to promote science and art; and they, again, would be able to exert a greater influence on intellectual progress than they can in their present dissevered state. The Union of Societies was considered as one of locality merely, their juxta-position not being allowed to interfere with their independent existence or self-government. The plan which it is our object in this Report to suggest would at once supply the means of satisfying the desire for juxta-position thus strongly and repeatedly expressed, by securing a locality sufficiently large, and adapted for the purpose.

Purchase of land necessary for the execution of the objects contemplated.

It will be evident from what has been already stated as to the want of space even for the proper development of existing institutions, that to carry out the objects thus contemplated, the purchase of land as a preliminary step becomes absolutely necessary; and this will be still more strongly shown by a reference to the difficulties originally encountered by us with respect to the site of the Exhibition Building. Not only was the appropriation of any portion of any of the Royal Parks to such a purpose strongly objected to, whether such appropriation were to be of a more or less permanent description, or of an absolutely temporary nature, but the whole scheme of the Exhibition was in very great danger of being brought to an untimely end, after having been long and widely spread over the world, owing to objections connected with the question of the site; and the more recent discussion that took place on the subject of the removal of the Building has again shown that the feeling which created those difficulties still continues to exist. It has, therefore, been apparent to us, that the obstacles standing in the way of using any of the parks, or other public property, for the temporary purposes of the Exhibition, would be obstacles of an insuperable character, when it becomes a question of finding a convenient and unobjectionable site for objects of a permanent nature.

Report on site of new National Gallery.

Proceeding now to the question of locality, we would call attention to a Report from a Commission, appointed last year, to "consider the question of a site for a New National Gallery," which Report was laid before Parliament in August, 1851. The Commissioners (Lord Seymour, Lord Colborne, Sir Charles Eastlake, Mr. Ewart, and Sir Richard Westmacott,) there stated their opinion of the advantages for such a purpose of the neighbourhood of Hyde Park and Kensington, not only on account of the dry character of the soil, but also because "those large open spaces afford a present security against the inconveniences to which the National Gallery is exposed, and are the only grounds which remain safe for future years amidst the growth of the metropolis."

They then reported, that, from information which they had received, they believed that "from 15 to 20 acres of land, with a frontage to the park, might yet be obtained at a reasonable price, which would afford a space for the construction of a Gallery on an eligible site;" after which they proceeded to discuss the ques-

tion of a site in Kensington Gardens, in case the outlay which would be involved by making such a purchase should be deemed inexpedient.

It was for obvious reasons, that this Commission alluded only in the vague manner above shown to the locality in question, as any greater precision would have had the inevitable effect of enhancing the price that would be asked for the land.

Gore House Estate purchased by Commissioners.

It is understood that the late Government were actually in negociation for a piece of ground, for public purposes, of the character referred to. From some cause that negociation was broken off. It appeared to us so important to secure this locality that, through the zealous and disinterested instrumentality of Mr. Kelk, the builder, we have obtained possession of the land for which the Government had been treating.

The estate, which is very nearly opposite the site of the Exhibition Building, is best known by the name of the "Gore House Estate." It contains about 21½ acres, and is situated at Kensington Gore, about midway between Prince's Gate and Kensington Gate, and faces Hyde Park, possessing a frontage of between 500 and 600 feet. The cost of the estate has been 60,000*l.*

Insufficient in extent.

The above property presents great advantages of position, and will be found extremely valuable in serving, as far as its limited extent permits, as a locality on which to develop any scheme of public utility, the execution of which involves, as a necessary condition, the acquisition of a site. But it appeared obvious to us that a space of little more than 20 acres would be quite insufficient to admit of the full and satisfactory development of a plan so comprehensive as the one suggested by us, and which is intended to meet, not only existing wants, but such as in the progress of time the advance of knowledge in Science and Art may render apparent. For this object, a much larger extent of ground would be required.

Evils of want of foresight in providing for public wants.

It is unnecessary for us to point out the evils which have unfortunately so frequently arisen in practice in this country from a want of foresight in this respect, attention having generally been confined to the absolute and pressing requirements of the moment, without providing for their inevitable extension. It has been usual, in purchasing property for public purposes, to obtain only the exact space needed at the time of the purchase, and even to re-sell any amount of ground that might remain over and above that called for by the exigencies of the case. The invariable consequence of this mode of proceeding is, that adjacent land, which might have been procured on reasonable terms in the first instance, immediately rises in value, passes into the hands of other persons who invest large sums in erecting houses and buildings upon it, and when at length it becomes absolutely necessary to obtain it, in order to satisfy the public wants—which will not remain stationary, and cannot be disregarded—the most exorbitant sums have to be paid for it.

Nor is it necessary to point to the lamentable fact that, even when this has been done, most of our public buildings remain subject to the disadvantages of being placed in such a situation, from the crowding of surrounding houses, that they are without light or air, have no convenient access, and cannot be seen to any advantage, and that the extensions which may have been effected, are ill-arranged for their purpose, inconvenient, and inharmonious in their effect.

Examples of cost of obtaining space. British Museum.

A striking instance of the cost of obtaining space for the extension of great national objects, is to be found in the case of the British Museum, where a sum

exceeding, on the average, 40,000*l.*, has been annually voted by Parliament for a long succession of years, to defray the cost of the new buildings required there. Notwithstanding this large outlay, it has been shown in an earlier part of this Report, that the space which has thus been provided is entirely insufficient even for the present necessities of the Museum, and it appears from a Return laid before Parliament last session, that a sum of not less than 67,500*l.*, would be required to purchase a few neighbouring houses which it would be necessary to demolish, in order to obtain the additional space required.*

Metropolitan Improvements.

A similar history attaches to the various metropolitan improvements, which are rarely undertaken until the great lines of communication (which ought to have been originally provided for, but the necessity for which becomes only fully apparent with the growth of the town,) have been already covered with houses and buildings. The expense at which these improvements have then to be carried out is of course enormous.

As an instance of the cost of making improvements in the Metropolis, it may be mentioned that the outlay on some of the more important improvements undertaken of late years have been as follows:—

Line of Street.	Area of Property purchased.	Total Cost.	Average Cost per Acre.
	Square feet.	£.	£.
Oxford Street to Holborn - - -	220,151	290,000	57,380
Bow Street to Charlotte Street - -	61,653	96,000	67,827
Coventry Street to Long Acre - -	65,410	180,000	119,871

It is also within our cognizance that no less than 25,000*l.* per acre was paid for 10 acres of the site occupied by one of the chief railway termini in London.

Provincial Towns.

In such towns as Liverpool, Manchester, Birmingham, and Leeds, the price of sites for public buildings, streets, railway stations, &c., is frequently most excessive. In Manchester, from 10*l.* to 12*l.* per square yard (being at the rate of from 50,000*l.* to 60,000*l.* per acre), is a common price for the land on which the warehouse property is built, and as much as 40*l.* per square yard (or at the rate of nearly 200,000*l.* per acre), has been paid for land in the centre of the town. In Birmingham, again, some surplus land in the centre of the town belonging to the London and North Western Railway Company, has, within the last few weeks, been sold at the average price of 11*l.* 16*s.* per yard, or at the rate of more than 57,000*l.* per acre; while a portion fetched 13*l.* 10*s.* per yard, or upwards of 65,000*l.* per acre.

In the same manner, land at Liverpool, in the immediate neighbourhood of the Town Hall and Exchange buildings, sells for 30*l.* per square yard, or at the rate of nearly 150,000*l.* per acre; and in extreme cases, 40*l.* per square yard, or nearly 200,000*l.* per acre, has been given. At a distance of 300 yards from the above, and off the great thoroughfares, land has sold for 20*l.* per square yard, or nearly 100,000*l.* per acre; while, even at the distance of more than a mile from that

* See Parliamentary Return, headed "British Museum," No. 557, of 1852.

central point, and in a direction quite away from business, land has been bought for building purposes, in quantities exceeding an acre, at from 35*s.* to 38*s.* per square yard, or at the rate of from 8,470*l.* to 9,196*l.* per acre.

Illustrations of the difficulty of correctly estimating prospective wants.

In contrast to the above instances, and in illustration of the difficulty of correctly estimating prospective wants, we may be allowed to mention a case which has come within our knowledge, in which one of the principal Railway Companies possessing termini in London required a certain area for the formation of its metropolitan station. In order to insure the possession of sufficient space, the Directors applied to Parliament for permission to purchase compulsorily upwards of 50 acres for that purpose. The application was strenuously opposed, on the ground that such an amount of space was more than double what could be possibly required. The Directors, however, succeeded in obtaining the powers sought for by them, and the result has shown the prudence of their having done so, as the whole of that large space has proved to be requisite, and the Company has escaped the necessity of purchasing the additional land at a later period, when its cost must obviously have been expected to have increased.

We understand that in the case of another great Railway Company, the metropolitan terminus of which it has recently been found necessary to extend, the price that has now to be paid for the requisite land is more than four times the price for which it might have been obtained ten years ago, although it remains in precisely the same state as it did then.

Necessity of Commissioners securing ample space.

Profiting, therefore, by the experience derived from previous cases, we were anxious not to put forward our scheme before we had secured such an amount of land as might be considered really to meet probable emergencies. A space of 150 acres, if it could have been obtained by us, would, in our opinion, have been by no means an excessive provision, while less than half that amount would certainly be insufficient.

The unoccupied ground contiguous to our first purchase, seemed to afford us the facility of obtaining the utmost amount of space that could be required for the full development of the scheme proposed by us, and was indeed the principal inducement to us in concluding that purchase.

Means insufficient.

But while it was obvious to us on the one hand, that our own means were totally insufficient to provide the extent of land required for the objects we have in view, it appeared, on the other, that those objects comprehended an extension of National Institutions which did not come properly within our competence, but which the Government had been repeatedly urged in Parliament to supply, and was known to us to be now actually considering the best means of providing. Under these circumstances, it appeared to us that in no way could those objects and the interests of the public be so well or so economically secured, as by a harmony of action between the Government and ourselves.

Resolution adopted, conditional on Government co-operation.

We therefore passed a resolution authorizing the outlay of a sum not exceeding 150,000*l.* of the surplus in the purchase of land (including our first purchase), upon the condition that Her Majesty's Government would engage to recommend to Parliament the contribution of a sum of like amount towards the purchases contemplated, either for account of the Royal Commission or for the joint account of the Commission and the Government, or for division between them, as might afterwards be determined.

This assurance having being obtained by us, we felt that we were placed in a position which would justify us in proceeding, without an injurious loss of time, to make the further purchases; being at the same time fully aware that we should be doing so at our own risk, but equally convinced that under the peculiar circumstances of the case, it was our duty to the country not to shrink from incurring that responsibility.

Purchase of Baron Villars' estate.

Accordingly, we entered into negociations with the trustees of the Baron de Villars, for the purchase of an estate belonging to him, of the extent of 48 acres, and adjoining the Gore House Estate already purchased by us. The result of those negociations, which were conducted gratuitously on our behalf by Mr. Thomas Cubitt (whose long and practical experience in such matters has been of the greatest service to us), has been, that we have secured the possession of this estate for the sum of 153,500*l*. Of this amount, the sum of 15,000*l*. has been already paid by us as a deposit.

Negociations with several other neighbouring proprietors have up to the present time led to no result.

The total space that has thus been already secured by us contains nearly 70 acres; and it is very important to observe, that the present is the last opportunity of finding an unoccupied space in a desirable situation, within the limits of the Metropolis, which is so rapidly extending in a westerly direction.

Although we are of opinion that, in making purchases to the extent to which we have above referred, we have taken upon ourselves as great an amount of responsibility as we had felt justified in incurring, yet we cannot refrain from suggesting for the consideration of Her Majesty's Government whether they would not be exercising a wise economy in recommending Parliament to obtain possession of the whole of the unoccupied ground adjoining that purchased by us, by which means a total extent of about 150 acres would be secured for the development of great national objects, such as those pointed out in this Report, the opportunity being one which, if now lost, cannot possibly recur.

Position of locality is favourable and convenient.

The distance of this locality from the centre of the Metropolis has not appeared to us to be in any way an objection to the site we have obtained. The success of the Exhibition, on a spot almost exactly opposite it, to which upwards of six million visits were paid, has clearly shown that that part of London is not too remote for visitors; while it has been ascertained, by an analysis of their addresses, that the great proportion of the members of the principal scientific bodies live considerably to the west of Charing Cross.

Apportionment of ground.

The question of the apportionment of the ground among the different institutions to be erected upon it, or of its division between the Government and the Royal Commission, as already spoken of, must obviously be left for future consideration and arrangement. It appears to us, however, that it would be desirable that the new National Gallery, if placed in this locality, should occupy the advantageous and more elevated site fronting Hyde Park, on the Gore House estate, while an institution like the Commercial Museum, or Museum of Manufactures, already suggested by us, might be established on the corresponding site fronting the Brompton-road, at the further end of the property; the central portion containing a building in which the different societies might procure that juxtaposition, the means of effecting which, as we have before mentioned,

they have been for several years considering ; while the two sides might be devoted to the departments of Practical Art and of Practical Science.

Immediate enjoyment of ground may be secured to public.

Although a considerable period will naturally be required for the development of a plan of the comprehensive nature of that which we have now submitted, intended as it is to furnish the means of providing for public wants even at distant times, yet an immediate enjoyment of the grounds may be secured to the public, affording a useful and agreeable addition to that offered by Hyde Park and Kensington Gardens.

Conclusion.

In the preceding part of the Report we have shown, by pointing to the many Institutions so liberally supported both by the Public and the State, the injustice of the reproach to this country, that it makes no efforts for the promotion of Science and Art ; but we have confessed likewise, that though a larger amount of money is spent for those objects in this Metropolis than, perhaps, in any country, yet this is the only country which has neither supplied (in any practical or systematic shape) scientific nor artistic instruction to its industrial population ; nor provided, for men of Science and Art, a centre of action, and of exchange of the results of their labours, affording at the same time the means of establishing the connexion between them and the public which would secure permanent relations of reciprocal influence.

Yet this country, as the centre of the commerce and industry of the world, would seem to require, more than any other, to have these wants supplied ; and the Great Exhibition of 1851 has, in its results, convinced us that, unless they be speedily satisfied, this country will run serious risk of losing that position which is now its strength and pride.

We believe that we have shown that want of space and want of system have hitherto been the main impediments to their being so satisfied. We have endeavoured to remove these, by procuring a spacious and unencumbered piece of ground, situated in a most favourable locality, and near the very spot on which the Crystal Palace displayed the products of the industry of all the nations of the earth,—and by suggesting a system based upon the scientific subdivision and arrangement of that vast collection, which left none of the industrial products or wants of man unrepresented.

We propose to trust, for the carrying out of our plan, to the same principles which alone have rendered the execution of so large an undertaking as the Exhibition of 1851 possible within so limited a time ; viz., the finding room and system, and leaving it to the voluntary efforts of individuals, corporations, and authorities, to carry out the promotion of the different interests with which they are themselves connected, on which they are dependent, and of which they are therefore the best guardians and judges.

We intend to pursue these objects by the same means, namely, by affording instruction and recreation to the greatest number of human beings, and by acting on the conviction that all sciences and all arts have only one end—the promotion of the happiness of mankind, and that they cannot perfectly obtain that end without combination and unity.

We propose that in the advantages which the institution thus shadowed out may offer, the natives of foreign countries shall be received on a footing of equality

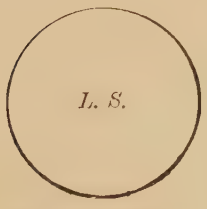
with the inhabitants of our own land, and of Her Majesty's colonial possessions, and we anticipate the greatest benefit from the permanent interchange of the thoughts and acquirements of the different nations.

We refrain, for obvious reasons, from entering at present into any details as to how the scheme connected with that part of the institution devoted to instruction may be carried into effect; but we believe that we are able to point out and establish a system by which the Metropolitan Institution will be rendered only the centre of a system of local institutions, aided by local exertion and association, thus securing to our manufacturing population sound industrial knowledge; while, by confining our attention to technical instruction, and not extending it to general education in science and art, we shall be adding to, without interfering with, the means of instruction already existing in schools and colleges. As a preliminary knowledge of the principles of science and of art would be required by the students entering the institution proposed by us, the effect would be to give an impetus to general education, which could not fail to be of material advantage to those bodies.

We are aware that the success of this undertaking must, under Divine Providence, entirely depend upon the support which it may receive from the co-operation of the public, the assistance of Parliament, and the sanction of the Crown.

We believe that we have correctly appreciated the feelings and wants of the people of this country, and the many proofs of interest and favour shown by our Sovereign towards the object of our labours, induce us to hope that, should we be correct in this belief, we may continue to enjoy the countenance of Her Majesty.

Given under our Corporate Seal, at the Palace of Westminster, this Eleventh day of November, 1852.



EDGAR A. BOWRING,
Secretary.

ALBERT.
BUCCLEUCH.
DERBY.
ROSSE.
GRANVILLE.
EGERTON ELLESMERE.
OVERSTONE.
J. RUSSELL.
H. LABOUCHERE.
W. E. GLADSTONE.
A. Y. SPEARMAN.
J. W. HOGG.
R. WESTMACOTT.
CHARLES LYELL.
C. L. EASTLAKE.
W. CUBITT.
CHARLES BARRY.
THOMAS BARING.
THOMAS BAZLEY.
RICHARD COBDEN.
WALTER COULSON.
C. WENTWORTH DILKE.
T. F. GIBSON.
JOHN GOTT.
W. HOPKINS.
PHILIP PUSEY.
J. M. RENDEL.
JOHN SHEPHERD.
ROBERT STEPHENSON.
WILLIAM THOMPSON.

APPENDIX.

APPENDIX A.

STATEMENT showing the Probable Amount which will remain at the disposal of the Commissioners after completing all the Services immediately connected with the Exhibition.

	£.	s.	d.	£.	s.	d.
Balance already reported, 29th February, 1852				213,305	15	8
Receipts—	£.	s.	d.			
From Sale of Materials, &c.	1,268	10	9			
Interest on Exchequer Bills	4,734	8	5			
Arrears of Subscriptions	497	9	8			
Miscellaneous	31	13	9			
				6,532	2	7
				219,837	18	3
Current Expenditure from 1st March to 31st October inclusive, *viz.*—						
Salaries, including 1,353*l.* 14s. 4*d.* for services rendered during the Exhibition, but unpaid at date of First Report	2,598	0	4			
Extra clerks	404	6	6			
Rent of office, rates, taxes, &c.	413	9	4			
Stationery	143	17	5			
Printing and lithographing	506	19	0			
Postage and carriage of parcels	113	8	11			
Fittings, &c., to Building not paid at date of First Report	196	7	1			
Accidents and repairs ditto ditto	60	9	7			
Fire arrangements ditto ditto	31	8	9			
Supply of gas ditto ditto	26	3	8			
Implements and tools ditto ditto	92	18	10			
Payments on account of Money Awards by Juries	10	0	0			
Ditto ditto Medals	4,656	15	0			
Ditto ditto Medal-cases	583	1	10			
Ditto ditto Certificates	514	16	7			
Ditto ditto printing and preparation of Jurors' Reports	9,267	12	0			
Ditto ditto Illustrated Copies for presentation	1,201	7	10			
Ditto ditto binding Exhibitors' Trade Circulars	165	6	3			
Ditto ditto Trade collection	356	8	1			
Payments on account of services under Messrs. Munday's contract	932	18	5			
Payment to Messrs. Spicer and Clowes, on account of losses	1,600	0	0			
Payment on account of "Mechanics' Home"	1,000	0	0			
Law expenses	63	16	9			
Contingencies	260	3	1			
	25,199	15	3			
Probable future expenses in connexion with the above services	21,340	0	0			
				46,539	15	3
Estimated amount of Surplus				£173,298	3	0

November 1, 1852.

HENRY C. OWEN,
Captain R. E., Financial Officer.

APPENDIX B.

ABSTRACT of SUGGESTIONS and APPLICATIONS received by the COMMISSIONERS on the subject of the disposal of the SURPLUS FUNDS of the EXHIBITION of 1851.

NAME.	DESCRIPTION.
I.—*Suggesting the Application of the Surplus to Mechanics' Institutions and Schools of Design, &c.*	
Ayr Mechanics' Institution	Mechanics' Institutions and Schools of Design.
Bilston Mechanics' Institution	Mechanics' Institutions and Schools of Design.
Bolton Mechanics' Institution	Mechanics' Institutions and Schools of Design.
Carlisle Mechanics' Institution	Mechanics' Institutions and Schools of Design.
Carmarthen Mechanics' Institution	Mechanics' Institutions and Schools of Design.
Chichester Mechanics' Institution	Literary Societies and Mechanics' Institutions.
Cockermouth Mechanics' Institution	Mechanics' Institutes, Museums, Public Reading Rooms, and Libraries.
Glasgow Mechanics' Institution	Metropolitan and Provincial Scientific Institutions.
Glasgow Anderson's University	Metropolitan and Provincial Scientific Institutions.
Hexham Mechanics' Literary and Scientific Institution.	Mechanics' Institutes and Schools of Design.
Holmfirth Mechanics' Institution	Mechanics' Institutions and Schools of Design.
Keighley Mechanics' Institution	Mechanics' Institutes and Schools of Design.
Leeds Mechanics' Institution	Mechanics' Institutions.
London Mechanics' Institution	Literary and Mechanics' Institutions.
Manchester School of Design	Schools of Design.
Newark Mechanics' Institution	Mechanics' Institutes and Schools of Design.
Newcastle-on-Tyne Mechanics' Institution.	Mechanics Institutions and Schools of Design.
Newcastle-on-Tyne School of Design	Schools of Design.
Newcastle-on-Tyne and Gateshead, Local Committee.	Scientific Institutions in Provincial Towns.
Paisley Mechanics' Institution	Mechanics' Institutions and Schools of Design.
Selby Mechanics' Institution	Mechanics' Institutions.
Sheffield School of Design	Schools of Design.
Stourbridge Mechanics' Institution	Mechanics' Institutions and Schools of Design.
Warrington Mechanics' Institution	Mechanics' Institutions and Schools of Design.
Westminster Literary, Scientific, and Mechanics' Institution.	Scientific Institutions.
Wilsden Mechanics' Institution	Mechanics' Institutes and Schools of Design.
Workington Mechanics' Institution	Mechanics' Institutes and Schools of Design.
II.—*Suggesting the Establishment of a Central College of Arts and Manufactures in connection with Provincial Schools, &c.*	
Birmingham, Inhabitants of	Central College of Arts and Manufactures in connection with Provincial Schools.
Bristol, Inhabitants of	Central College of Arts and Manufactures in connection with Provincial Schools.
Halifax, Inhabitants of	National College of Arts and Industry in connection with Provincial Schools.
Hull, Inhabitants of (two Memorials)	Central College of Arts and Manufactures in connection with Provincial Schools.
Lloyd, Lieut.-Colonel (Special Commissioner).	College of Arts and Manufactures.
Oldham, Inhabitants of	Central College of Arts and Manufactures in connection with Provincial Schools.
Sheffield, Inhabitants of	Central College of Arts and Manufactures in connection with Provincial Schools.
Staffordshire Potteries, Committee	Central College of Arts and Manufactures in connection with Provincial Schools.

Name.	Description.
III.—*Applying for a Return of Subscriptions to Local Committees, for the purpose of being appropriated to Local Institutions.*	
Belfast, Local Committee – –	Return of subscriptions, amounting to 300*l.*, in order that they may be applied in aid of local projects designed to extend the knowledge of decorative art, &c.
Blackburn, Local Committee – –	Return of subscriptions, amounting to 710*l.*, to be appropriated to the establishment of a Public Library and Museum.
Bradford, Local Committee – –	Return of the amount subscribed, 1,100*l.*; together with a grant of from 2,000*l.* to 3,000*l.* for a School of Design.
Carlisle, Local Committee – –	Return of the amount subscribed, 200*l.*
Wakefield, Local Committee – –	Return of subscriptions to the various Local Committees.
Warrington, Local Committee –	Subscriptions to be applied to local Institutions by the Commissioners. 150*l.* subscribed by Warrington to be applied to the Building Fund of Warrington Museum and Free Library.
IV.—*Miscellaneous Suggestions and Applications.*	
Allen, Mr. C. B., London – – –	Establishment of a School of Art for Artist Workmen.
Archæological Institute of Great Britain and Ireland, London.	Formation of a Museum of Casts, &c.
Bakewell, Mr. F. C., Hampstead –	The fostering and trial of inventions.
Bannister, Mr. S., St. John's Wood	Formation of a Museum of Aboriginal Products.
Beaufort, M. de, London – – –	Rewards for Inventions.
Belfast, School of Design – – –	Grant of money for a Statue Gallery in connection with that School.
Berger, Mr. J. C., Islington – –	Winter Garden.
Birkett, Mr. R., Norwich – – –	An "Albert Park," near London.
Bolton, Local Committee – –	Statue of H.R.H. Prince Albert. Building to receive all models, drawings, manuscripts, &c., relating to the Exhibition. Site of "Crystal Palace" to be marked.
Bolton, Local Committee – – –	Grant of money for a permanent Free Library and Museum.
Booth, Rev. J., London – – –	Industrial Education of the Middle Classes.
Buckland, Lieut., London – –	Free Hospital for all Nations.
Chapman, Mr. J., Paddington – –	Depository of machines, models, drawings, books, &c.
Classon, Mr. J., Dublin – – –	Grant of money for a College of Industry in Dublin.
Clercq, M. de, Haarlem – – –	Institution of Industry.
Clonmel Mechanics Institue – –	Grant to the Institution.
Dublin Society, Royal – – –	Grant of 5,000*l.* for a Building for the Exhibition of Manufactures.
Eddison, Mr. E., Leeds – – –	Division of the Surplus amongst the various Towns in proportion to the amount subscribed.
Ellison, Rev. H., Bakewell – –	Foundation of Scholarships in connection with Industrial Schools.
Greenhalgh, Mr. J., Mansfield – –	Public Libraries, Musical Societies, and Recreation Grounds.
Halkett, Mr. A. P., London – –	Conversion of the Exhibition Building into a Winter Garden and Residences for Invalids.
Hauchett, Mr. J. M., Cheltenham –	Conversion of the Exhibition Building into a Public Reading Room.
Hunter, Mr. Alex., Madras – –	Grant of Money in aid of the Madras School of Industrial Arts.
Jopling, Mr. J., St. John's Wood –	Gallery of Geometrical Models, &c.
Kilkenny Literary and Scientific Institution.	Grant to the Institution.
Lewes Mechanics' Institution – –	The delivery of Lectures at Mechanics' Institutions.
London, Merchants, &c., of – –	Museum of Raw Produce in the City of London.
Macdonald, Dr., Invernesshire –	Alleviation of Irish and Highland destitution.

NAME.	DESCRIPTION.
IV.—*Miscellaneous Suggestions and Applications*—continued.	
Mann, Mr. J. H., Kentish Town -	Hall of Sculpture. Site of Exhibition Building to be marked.
Newton, Mr. C. T., British Museum	Museum of Casts of the Sculpture of all Nations.
Nottingham, Inhabitants of - -	College for Artizans of this and other countries, and a Museum.
O'Conor, Mr. R., Dublin - - -	Purchase of an estate in Ireland for H.R.H. Prince Albert.
Paddington, Mr. W., London - -	Conversion of the Exhibition Building into a Library for all Nations.
Patterson, Mr. A. H., Liége - -	National Museum of Industry.
Phillips, Mr. H. W., London - -	Travelling Studentships for skilled Artizans.
Pickett, Mr. Vose, London - -	Permanent Edifice for future Exhibitions.
Portsmouth and Portsea Literary and Philosophic Society.	Museum, &c.
Ryde Literary and Mechanics' Institution.	Provincial claims urged.
Scottish Society of Arts - - -	Grant of 10,000*l.* for a Building for the Society, in order to aid the extension of its labours.
Sheffield, the Mayor and Aldermen of.	Museums and Educational Institutions.
Sinclair, Mr. G., Whithorn, N. B. -	Gardens, &c., on the site of the Exhibition Building.
Sleigh, Mr. S. H., London - -	Supplemental Exhibition of Works of Art of all Nations.
Society of Arts, London - - -	Grant of 10,000*l.* towards the erection of a building.
Suburban Artisan Schools, the Committee of, Camden Town.	Grant of Money for the promotion of Artisan Instruction.
Sunderland, Local Committee -	Promotion of Practical Science.
Tebay, Mr. J., London - - -	National Gallery of the Fine Arts. Establishment of Schools of Art.

APPENDIX C.

Copies of Memorials praying for the Establishment of a Central Institution of Arts and Manufactures.

No. 1. Birmingham.

To His Royal Highness Prince Albert and others, the Royal Commissioners for the Exhibition of the Industry of all Nations for 1851.

We the undersigned magistrates, merchants, manufacturers, designers, and others, interested in the commercial and manufacturing prosperity of the Borough of Birmingham, beg respectfully to address your Honourable Board.

Your Memorialists have witnessed with the highest gratification and pride the unparalleled success of the Exhibition of 1851, and the beneficial results which it has drawn forth, and which will be felt not only by this nation, but by the whole civilized world.

This vast undertaking, conceived in the first instance by your Royal Highness, interpreted in its true light by the various great manufacturing districts of this kingdom, and carried out so effectively by all nations, has produced a large surplus from its revenues, which, if devoted to some great object, might extend the beneficial effects of the Exhibition of 1851 over centuries to come.

With this object, your Memorialists, as partly representing one of the greatest manufacturing towns of the empire, have felt called on to address your Board.

Amongst the many projects for usefully disposing of the large sum of money alluded to, one, apparently the most favoured, has been to purchase the Great Building for the purpose of creating a Winter Garden.

Your Memorialists feel that whatever might be their individual opinions on the advantages of such a project to the inhabitants of, and visitors to the Metropolis, still they cannot perceive that the solemn pledge given to the original subscribers and to the country, to devote any surplus to the promotion and improvement of arts and manufactures could be fully carried out by such an appropriation, or that such would benefit the nation generally.

Your Memorialists have long felt the necessity of some more extended system of practical and scientific education in England, which should place within the reach of the industrial classes a much higher standard of scientific attainments than they can now ever hope to possess without very ample means.

Your Memorialists are convinced that with greater facilities in elementary scientific education, intimately connected with, and always accompanied by practical illustrations and manipulations, there would be found as much original genius and talent to develop in the people of this country, as in those of the great continental states of Europe; and that such development would greatly facilitate the maintenance and extension of our manufactures and commerce.

The great and rapid strides which locomotion has taken on the Continent, and the constant international communication which is the result, have extended science and mechanical and artistical knowledge widely over those nations; and thus one vast school of arts and sciences exists, with its members in constant communication, from which this country is partly excluded by its geographical position.

Some of your Memorialists, in their late visit to Paris, have witnessed the advantages which the rising generation of manufacturers is there enjoying in their educational establishments; and although not favoured by the possession of such vast resources in raw materials, mineral wealth and fuel as Great Britain has the blessing to enjoy, they have established such colleges as the Conservatory of Arts and Manufactures, and the Central School of Arts and Manufactures, which are especially destined for the instruction of manufacturers and artisans, either entirely free or at a low charge.

These Central Colleges, under the charge of the State, and with most efficient and interesting museums attached, have ramifications extending over other important manufacturing districts of the country.

In such schools are the youth of France brought up, receiving, particularly in the provincial schools attached to the Conservatory, and in the Central School of Arts, the highest standard of scientific instruction in connexion with the arts, manufactures, and design, matured by practical illustrations and experience in manipulation, and a knowledge of the particular trade in which they are eventually to devote their professional talent as designers.

Numerous young men educated at these colleges, of first-rate talent and practical experience, pass examinations of very high standard, and receive diplomas which are a passport for them to many parts of the Continent as managers and directors of most important manu-

factories and establishments, and enabling them to find lucrative employment even in England.

From these sources have sprung some of the most eminent men of the age, enjoying rank, consideration, and wealth, derived from the systematic education which they receive there.

Your Memorialists admit with pleasure and gratitude that the Government has already made a great step in advancing this object by the establishment of Schools of Design, and the Museum of Practical Geology; but still the first are only partial in their advantages, and the latter only an isolated branch, which exerts but little immediate beneficial influence over the arts and manufactures generally.

Your Memorialists, therefore, deeply convinced that a more general and efficient system of scientific practical education is required, would respectfully suggest to your Honourable Board, that the Exhibition of 1851 has developed more fully the necessity for such means of instruction, and has also provided ample means for accomplishing an object so closely allied to the original intention respecting the disposal of any surplus receipts from the Exhibition.

For such reasons your Memorialists would solicit that a great Central College of Arts and Manufactures should be established in London, and endowed with the whole of such surplus receipts, which will probably exceed 200,000*l*., and that a Museum of Arts and Manufactures shall be formed at the College, the basis of which might be most advantageously selected from the present Exhibition.

That provincial schools having the same object in view (such as schools of design) should have connexion with the Great Central College, and be carried on under the same system; and in order that the public may be satisfied with the administration of their provincial establishments, and have a voice in the general system of Education, which is of such vital importance to their own commercial prosperity, your Memorialists would suggest that where such provincial schools may be founded in boroughs, the Mayors should be *ex-officio* Members of the General Board of Metropolitan Direction.

Your Memorialists have thus endeavoured to set forth to your Honourable Board the sentiments which have so strongly urged them to act. They are desirous to devote their best energies in furtherance of an object which they feel is for the honour and welfare of their country; and they have the fullest confidence that your Royal Highness and the Royal Commissioners, who have carried out so successfully the vast undertaking which devolved on them, are the persons pre-eminently qualified to undertake an object of such great national importance.

No. 2. Bristol.

To His Royal Highness Prince Albert and the other Royal Commissioners for the Great Exhibition of 1851.

The Memorial of the undersigned Magistrates, Bankers, Manufacturers, and others, inhabitants of the City of Bristol, Subscribers towards the Funds raised for promoting the Great Exhibition.

Your Memorialists most respectfully approach your Honourable Board with an expression of their warmest congratulations at the unparalleled success which has crowned the exertions of your Royal Highness and your colleagues in establishing and bringing to so gratifying an issue an undertaking which has justly received such universal admiration. These congratulations have reference not only to the past, but to the anticipated benefits which your Memorialists confidently expect will be the result of the Exhibition, not to our own nation alone, but to the whole civilized world.

Your Memorialists have heard with unfeigned pleasure that the funds of the Exhibition will be sufficient, after meeting every demand on them, to realize a very considerable surplus; and your Memorialists, having lent their assistance in causing this surplus, consider they will not be exceeding the bounds of respect due to your Royal Highness and the other Commissioners if they venture an opinion as to its application.

The project of establishing a Winter Park and Garden in London on a self-supporting principle, has attracted a considerable portion of public attention, and deservedly so, as it would preserve to the country the wonderful structure in which the Exhibition is held. Desirable, however, as such an object may be, and adding, as it doubtless would, to the attractions and probably to the health of the metropolis, your Memorialists are yet of opinion that some object of more general utility could be attained, which would be a better application of your funds, be more conducive to national prosperity, and more in accordance with the expressed intentions of the Commissioners to appropriate any surplus "to purposes strictly in connexion with the ends of the Exhibition."

At a moment like the present your Memorialists have no doubt that your Honourable Board are in constant receipt of projects for the application of this surplus from parties of most varied opinions, and suggesting schemes of every possible shade of difference, and your Memorialists are therefore reluctant to do more than express their approbation of a plan which they consider presents prospective advantages of greater magnitude to the whole com-

munity than any other that has been brought under their notice, namely, the establishment of a Collegiate Institution in London, resembling in some degree the Central School of Arts and Manufactures at Paris.

It would be superfluous in your Memorialists to point out the advantages resulting to our artizans from having within their power the means of obtaining, at a moderate expense, a sound scientific and practical education in those branches of trade or manufacture to which their lives are to be devoted. These advantages are too obvious and well known to your Honourable Board to require more than a simple allusion to them, and your Memorialists think that no more legitimate mode of applying the surplus at your disposal can exist than by appropriating it to the elevation of the character and intellect of the British workman, to whose skill and ingenuity (however untutored) the Great Exhibition owes so much; by encouraging discovery, stimulating industry, and offering him the same facilities for acquiring knowledge in his profession which are enjoyed by his foreign competitors.

Your Memorialists abstain from any details as to the benefits to be derived from the adoption of such an institution, and content themselves with merely suggesting that if any plan analogous to that above referred to should meet the approval and countenance of your Honourable Board, you will devise such means as will render it as diffusive as possible, and take measures that it shall become an institution not confined to one locality, but by means of provincial schools in connexion with a Metropolitan Central College, pervading and receiving attention and encouragement in the great manufacturing and commercial cities of the empire, so that what is at this moment a just source of national pride, may, in its ultimate results, prove a national blessing.

No. 3. Halifax.

To Her Majesty's Royal Commissioners for promoting the Exhibition of Works of Industry of all Nations.

The undersigned Memorialists, Magistrates, Merchants, Manufacturers, and others, interested in the commercial prosperity of the town of Halifax, viewing the approaching close of the Exhibition, humbly approach your Honourable Board, desiring, in the first place, to offer their hearty congratulations to His Royal Highness the Prince Albert, with whom originated the truly noble scheme, as also to your Honourable Board, who, under the Presidency of His Royal Highness, have conducted it to so successful a conclusion, exceeding by far in its steady career the most sanguine expectations which could have been entertained of the vast amount of interest and advantage to be afforded by its accumulated productions, not only of this but of nearly every other country of the globe, where the development of art or progress of science have been at all enjoyed. The universal response acceded to the grand challenge of industry and enterprise is at once a subject of the proudest gratification, and yields the strongest proof of the great social advantages to be expected from the Exhibition, whilst the stimulus it will yield to the nobler exercises of human ingenuity and industry may safely be calculated upon from the thousands who have availed themselves of the opportunity of inspecting its rich treasures of the operative as well as the wealthier classes of every civilized nation of the earth.

Your Memorialists have further witnessed, with much gratification, that, in a financial point of view, the Exhibition has been alike successful, placing your Honourable Board in the agreeable position of having a surplus to appropriate instead of having to draw for the necessary expenses upon the assistance of the State or the further liability of the public. To the appropriation of this surplus your Memorialists would now humbly address themselves.

Your Memorialists, immediately identified with one of the most important branches of the fancy textile productions of this country, have long felt, in common with other manufacturing districts, the great disadvantages under which they labour from the lack of a more accomplished education amongst the operative classes of the United Kingdom in the higher departments of art and science. Your Memorialists therefore humbly submit that a more appropriate dedication of the surplus funds, nor one more directly in harmony with the originally expressed intention of your Honourable Board, could hardly be adopted than that of founding on a national basis a scheme of education calculated to remove the disadvantages already referred to, alike important to the prosperity and welfare of every class of the community. It is abundantly recognised to what extent institutions of this kind have been promoted by our continental neighbours, and were practical evidences of the important benefits resulting from such a course not otherwise supplied, the truly elegant productions of France, Italy, and Germany, which grace their several departments in the Crystal Palace, would amply establish them.

Your Memorialists feel it unnecessary to enter upon the details of such a project, as they will be so much more ably dealt with by your Honourable Board. They would only add that, in their humble judgment, unless a grand Institution were founded, in which facilities were given of combining practice with theory, so that the student might pursue the one in direct association with the other, a scheme of such a character would best answer its purposes if

made to embrace a series of local establishments, acting under and in concert with one central Institution, constituting in the whole a National College or University of Arts and Industry, empowered to grant certificates or diplomas to students of proficiency and merit.

Your Memorialists offer their suggestions in full conviction that your Honourable Board will continue to act with the same energy and sound judgment which have hitherto distinguished your proceedings; and that the further exercise of your official authority will continue to be directed to the grand development of human skill and enterprise, commanding (as it hath hitherto done, at the hands of your Memorialists) the confidence and esteem of all classes of the people.

No. 4. Hull.

To His Royal Highness Prince Albert and the other Commissioners appointed by Her Majesty to carry into effect the Exhibition of 1851.

We, the undersigned Merchants, Importers, Manufacturers, and others, interested in the commercial prosperity of Hull, humbly present to your Honourable Board the following Memorial:—

Your Memorialists have observed with satisfaction the entire success of the Great Exhibition, and they look with confidence to the appropriation of the large surplus of money, in the full conviction that your Honourable Board will use it according to the pledge given to us, when subscriptions were demanded, that it would be applied "to purposes strictly in connexion with the ends of the Exhibition." Your Memorialists view the objects of the Exhibition to be the promotion of arts and manufactures and of international good will. They admire, and would gladly see retained as a winter garden, the magnificent edifice which covers the Exhibition; but as this would chiefly benefit London, and as it does not involve as a primary consideration the promotion of arts and manufactures, they do not consider the appropriation of the surplus to this purpose would be a strict fulfilment of the pledge given by your Board to the public.

Your Memorialists would call your attention to the great importance of Hull as a shipping town, and remarkable for the variety of its imports, which, to a great extent, consist of the raw materials used in manufactures. It is useless for them to insist upon their intimate connexion with the manufacturing interest, or point out the direct benefits which arise to them by developments of industrial skill.

Your Memorialists are in a position, from their connexion with the import and export trades, to state, that the increased facilities of transport have of late years produced a greater distribution of fuel and of raw materials over the world; and that the increased facilities thus afforded obviously necessitate an increased amount of knowledge, in its adaptation to manufactures, because the raw material, once from local circumstances confined to one country, now, at a reasonable rate, is made available to all countries.

Your Memorialists are informed that the great continental states of France and Germany are so fully convinced of this circumstance that they have established central colleges and provincial schools of arts and manufactures, which are exercising much influence in the progress of industry. Your Memorialists perceive that unless a system of industrial education is extended to this country, so as to enable our manufacturers to apply increased science and skill to their manufactures, England cannot keep her position in the great industrial competition of all nations; a competition which has for its effect the increase in value of skill and intelligence, as applied to the manufacture of that raw material, which, by the facilities of transport, is becoming decreased in price. Your Memorialists see, therefore, to themselves a great advantage in giving to manufacturers the means of acquiring a scientific knowledge of the principles of their industries, so that they may apply them with the best advantage to their respective wants.

Your Memorialists would therefore impress upon your Honourable Board the necessity of establishing a central College of Arts and Manufactures, in connexion with provincial schools, having the same object in view. They have full reliance that the great practical skill and aptitude of application which is a marking feature of the character of our countrymen, will enable our manufacturers to use the knowledge which they will thus have an opportunity of acquiring for the best purposes of industry.

Your Memorialists would like to see in connexion with the Central Educational Institution means for special international Exhibitions; as, for example, of silks in one part, pottery in another, and so on; and they believe that these might be made a source of profit, which could be used in the extension of the scheme of industrial education.

Your Memorialists leave with confidence the practical development of these views to your Board, in the full conviction that in your hands the surplus might be made to rear a noble educational monument worthy of the Exhibition which called it into existence.

No. 5. Oldham.

We, the undersigned Magistrates, Machinists, Cotton Spinners, Manufacturers, and others interested in the commercial prosperity of the Town of Oldham, humbly present to your Honourable Board the following considerations :—

Your Memorialists regarded with great interest the proposal for the establishment of an "Exhibition of all Nations," which, notwithstanding the many difficulties that threatened to interfere with its accomplishment, has been brought to so successful an issue. They have also beheld, with much satisfaction, the unique and splendid structure enclosed for its reception, which has proved, in all respects, so admirably adapted to its requirements.

Your Memorialists are aware that it has been proposed to retain the building for the purpose of a winter garden at the close of the Exhibition ; and while they do not consider that its retention for such an object would either be incompatible with its arrangements, or undesirable as a means of enjoyment and recreation to the inhabitants of the metropolis, they would respectfully submit that any appropriation of the surplus funds, arising from the Exhibition towards its accomplishment, would not be in strict accordance with the pledge given to the public when solicited to subscribe the necessary fund—that, "should any surplus remain, Her Majesty's Commissioners intend to apply the same to purposes strictly in connexion with the ends of the Exhibition, or for the establishment of similar exhibitions for the future."

Your Memorialists have observed, that it is proposed to collect specimens from the respective Exhibitors to be preserved as a record of the skill which has been displayed, and also for the purpose of future references ; and although they admit that such a collection would be exceedingly valuable as a museum of arts and manufactures, they are, nevertheless, of opinion, that it could only be permanently useful, in so far as it may be rendered available for the promotion of education in the principles and practice of industrial science.

Your Memorialists regret that there does not exist in this country any national institution devoted to instruction on a similar basis to the Schools of Arts and Manufactures established in France and Belgium, which, by imparting to their students the knowledge of the principles on which all improvements must be founded, have contributed so largely to the development of manufacturing skill.

Your Memorialists would, therefore, solicit your Honourable Board to take into consideration, in the disposal of the surplus fund which may remain in your hands, the immediate advantage which would be likely to accrue to the manufacturers of this country by the establishment of a Central College of Arts and Manufactures in connexion with provincial schools for the same object, which should include the existing Schools of Design. This institution to be empowered to make examinations and grant certificates to the more advanced students, and to promote, by these and similar means, the cultivation of increased knowledge in the application of science to practical pursuits, which could not fail to exercise a beneficial influence on industrial progress.

No. 6. Sheffield.

To Her Majesty's Commissioners for the Exhibition of 1851.

The undersigned Memorialists, Magistrates, Merchants, Manufacturers, Designers, and others interested in the commercial prosperity of the Town of Sheffield, humbly present to your Honourable Board the following considerations :—

Your Memorialists recollect that when the public were solicited for subscriptions to provide funds for the Great Exhibition they made their subscriptions absolute, under the express pledge that should any surplus remain Her Majesty's Commissioners were "to apply the same to purposes strictly in connexion with the ends of the Exhibition or for the establishment of similar exhibitions for the future."

Your Memorialists have viewed with pleasure the gigantic building erected for the Exhibition, and they do not object to the comfort and enjoyment which the inhabitants of London may derive from its retention as a Winter Garden, but your Memorialists could not view the appropriation of the surplus to this object as a strict fulfilment of the pledge to use the surplus for the promotion of the objects of arts and manufactures.

Your Memorialists fully recognise that the improvements in locomotion and in the applications of science are gradually rendering available to all countries the raw materials which formerly were the privilege of a few, and that in consequence, while the value of the raw material is becoming reduced as an element in manufacture, the value of skill and intelligence to its preparation as another element is constantly increasing.

Your Memorialists observe that other countries less favoured with fuel and raw materials than our own have recognised this fact as a principle of State, and have established schools of manufacture, including schools of design, not only at their capitals but also throughout their provincial towns.

Your Memorialists are informed that in France there is a "School of Arts and Manufactures" attended by three hundred students, who afterwards devote themselves to industrial pursuits, and are in great demand as managers by the manufacturers both of France and of Belgium. They are also informed that, in addition to this school, established and supported by manufacturers themselves, there is a Government institution, having provincial schools attached, called the "Conservatory of Arts and Manufactures," which also affords to the manufacturers and designers the education necessary to understand the principles of their respective industries.

Your Memorialists recognise in such institutions a wise intention on the part of foreign governments to develop manufactures by applying increased science, skill, and intelligence to their cultivation. They feel that in the increasing competition of the world it is necessary to join education to practice, and although they do not think that a practical education in industrial science can ever of itself make manufacturers, they are fully convinced that when the scientific principles of manufactures are more thoroughly understood by practical men they will better be able to apply them with advantage in their respective industries, and to promote economy and improvements in manufacturing processes.

Your Memorialists have observed that Government has considered it desirable to establish a Government School of Mines, in connexion with the Museum of Practical Geology, and they perceive in this act a recognition on the part of the State of the want of practical education to a large branch of industry. But your Memorialists in vain look for a college devoted to the industrial pursuits which they themselves follow, or to those important textile manufactures carried on by the neighbouring manufacturing towns.

Your Memorialists acknowledge that in collecting specimens from different Exhibitors, for the purpose, as they suppose, of founding a Museum of Arts and Manufactures, you are proceeding in the direction of education, but they are fully convinced that such collections can only be made efficiently useful when used as a basis of instruction, and that as a mere collection they cease to be of much importance in the advancement of industry.

Your Memorialists therefore present these points for your consideration, in order that you may judge whether arts and manufactures might not be much promoted by the establishment of a Central College of Arts and Manufactures in connexion with provincial schools for the same object. They consider that the Schools of Design might be made the nuclei for this more extended system of education, and that designers themselves would be benefited by being taught the principles of the manufacture for which they are afterwards to design, because by this means they would better understand its wants and the possibilities of manufacturing processes to carry designs into execution.

They consider that if these branch institutions and the Central College were united into one university of arts and manufactures, empowered to make examinations and grant certificates to those who showed sufficient knowledge, an impulse and position would be given to manufacturing science which could not fail to be of benefit to the progress of industry.

Your Memorialists would therefore submit these views to your Honourable Board, in the full conviction that your judgment would best mature the details necessary to carry into effect the most efficient plan for industrial education.

No. 7. Staffordshire Potteries.

To His Royal Highness Prince Albert, K. G., &c. &c. &c., and the Royal Commissioners for the Exhibition of 1851.

The Memorial of the Local Commissioners, and Members of the Local Committees of the Staffordshire Potteries, and their Vicinities, recommended by resolutions passed at a Meeting, held at the New Town Hall, Stoke-upon-Trent, on Wednesday, October the 1st, 1851.

J. Ayshford Wise, Esq., *in the Chair.*

Your Memorialists have observed with feelings of the highest gratification and pride the beneficial results which have already been developed by the triumphant success of the Great International Exhibition, and which, however largely important in their present actual realization, are still more valuable and comprehensive in expectancy, not only in their promised influence on our own country, but over the whole civilized globe.

As the time for the final close of this vast receptacle of the aggregate skill and industry of the world at large now so rapidly nears its advent, the question, as to the appropriation of the large surplus funds which its success has accumulated, so as best to perpetuate a reminiscence of the good already achieved by its consummation, and also to secure the means by which future advancement may be most reasonably and hopefully expected, now receives, as it demands, general and earnest attention.

It has been considered, and your Memorialists coincide in the opinion, that the application of those funds to the preservation of the Crystal Palace as a winter garden,—without at all reflecting on the general merits of the proposition, and the policy of its adoption on a distinct and separate footing—would have been a misappropriation, and contrary to the express

stipulation already made in the official decision, that any surplus should be "applied to purposes strictly in connexion with the ends of the Exhibition." Your Memorialists beg to suggest, that other and more pressing necessities are felt by all who take a prominent interest in the commercial welfare of this country, as demanding instant and prominent consideration.

The general success which has attended the combined display of England's manufacturing resources is far beyond what the most sanguine in her favour could have predicted, a success emphatically and generously admitted by her foreign competitors, and which has aroused, not only a feeling of justifiable pride in the position already maintained, but also a self-reliant determination to adopt such a course of probation as shall, in prospective contests, place her artistic capabilities on an equality with her mechanical powers.

Your Memorialists feel gratified that in their exertions to produce and contribute specimens of the various branches of their staple manufacture, they have been amply rewarded by the consciousness that their present favourable position has been fairly and creditably won, and is fully appreciated by other countries. They are at the same time conscious, that amidst this general success, there have been partial failures, and that in some of the higher classes of artistic labour they are deeply sensible of an inferiority which they are most anxious to remedy :—errors duly felt and candidly acknowledged are already half amended.

Your Memorialists are confidently of opinion, that a more extended and practical system of scientific education is necessary in this country, a system which should offer on readily available terms to the industrial classes of England a much higher standard of productive acquirements than they now possess, and that ample facilities for a sound elementary education, in intimate connexion with, and accompanied by, practical illustrations, alone are wanting to develop in our artists and artizans as large an amount of genius and talent as is evidenced in the best productions of the great Continental emporiums, and also that such a development would greatly tend to the increase of our manufactures and commerce.

The imperative necessity for such prompt and comprehensive measures as shall best serve to realize this desideratum, and the method by which such proficiency has been attained in other cases, was strikingly apparent to those who, during the late Paris fetes, visited the galleries of the Conservatory of Arts and Manufactures. The inspection of the material therein contained strongly impressed on the minds of all the vastly superior advantages, thoroughly matured, and fully organized, which France possesses for the education of her industrial classes, and the contrast which the solicitude of her government in this respect offers to the past supineness which has hitherto beset our own, must have been as marked as it was disheartening. The influence of such an establishment, aided by the still more comprehensive branches of education prosecuted in the Central College of Arts and Manufactures, conclusively demonstrate the means by which a nation in such immediate proximity with our own should still maintain in some branches of art labour, a superiority so decided. In these establishments the youth of France have, on conditions readily available, the advantages of a system of sound theoretical and practical instruction in all branches of art, science, and manufactures, carried on simultaneously with experimental illustrations educed from the materials, models, and machines, which the museums of their schools possess for the purposes of demonstration. Not only is the education thus afforded remarkably cheap, but the acquirement of high artistic and scientific knowledge, based on explanatory manipulations, becomes to the youthful students so fascinating that they will frequently pass at an early age an examination in which they display such high qualifications, that their services are eagerly sought for by almost all the great manufacturing countries of Europe. By these appliances have been raised some of the most eminent men of the age, enjoying rank, consideration, and wealth, resulting from the system of education which they have thus received.

Your Memorialists anxiously desire that by some suitable system of practical and scientific study, the inherent talent and industry of the productive classes of this country may be advantageously developed. They gratefully acknowledge the policy of the step made in this direction by the Government, in the foundation of the Schools of Design, and the Museum of Practical Geology; but the first are only partial in their advantages, and the latter but an isolated branch which exerts but little immediate influence on arts and manufactures generally.

Your Memorialists feel fully the value of the arguments set forth in the appeal on this subject from Birmingham to your Honourable Board, and would most earnestly and respectfully urge that due advantage be taken of the present opportunity, one altogether unprecedented, and probably without the chance of recurrence, to turn it to some great and lasting national benefit. They would therefore recommend that a central college of art and manufacture be established in London, and a museum connected with it. That provincial schools should be established, and conducted on similar principles to the Metropolitan Institution, and receive a proportion of its advantages, and that where such provincial schools or colleges may be established, the provincial authorities shall have prominent consideration in their control and management.

Your Memorialists trust that in making special reference to the peculiar claims of the Staffordshire Potteries, they will not be considered as assuming or seeking undue prominence, or in any degree disparaging the requirements of other localities—they would however beg

to direct attention to the peculiar capabilities which this branch of manufacture possesses for the ample development of artistic and scientific labour, and that of the highest class—involving in the composition of its primary essentials of bodies, glazes, and colours, the exercise of sound chemical knowledge, in the preparation and subsequent application of the material, presenting a field for the operations of considerable mechanical ingenuity,—and in its more advanced and final progress, affording a fitting and worthy medium for the display of artistic resources in their highest and most diversified powers of illustration, utterly without a parallel in the whole range of commercial industry.

Your Memorialists also recommend the selection by purchase of such objects in the Exhibition, or duplicates of them, as might best serve for models both suggestive and imitative, to the operatives engaged in the staple manufactures of this country, particularly directing attention to those exponents of industrial skill and talent in which our foreign rivals have gained supremacy.

It is a remarkable fact, when the personal wealth and commercial status of English manufactures are considered, to find that the districts in which the most important branches of their operations are carried on, are utterly without any fine examples available for general reference of the active capability and latent resources which the manufactures themselves possess, and of the degree of excellence to which superior skill and intelligence have already raised their productions.—Great successes are occasionally heard and read of, which excite either the marvel or incredulity of those engaged in the branches of labour to which they refer, but the opportunities of seeing, studying, and appreciating such results, and by continued examination, so thoroughly mastering the working of the processes by which their excellence has been achieved, as to be able to apply the lesson, if not with equal, at least in reference to past efforts, with improved skill, are few and far between, while to be effectual and permanent they should be ample and continuous.

It will be deplored if, after the costly and laborious accumulation of the most valuable products of the aggregate skill and industry of the present age, resulting from the combined energies of the whole world, its exhibition should end in the excitement of a *show*, instead of the experience of a *school*—becoming a transient gratification instead of a permanent advantage—and unless some further steps be taken to render that a *feeling* which is now but an *impulse*, the ultimate benefits so trustingly looked for will, it is to be feared, be sadly curtailed.

Your Memorialists have thus endeavoured to set forth their wishes. How their views and the attendant advantages which they are sanguine to believe would result from their adoption, may most conclusively and successfully be developed, they respectfully leave to the better judgment and experience of your Royal Highness and the Royal Commissioners, who have already, so far, satisfactorily accomplished the task for which Her Majesty was pleased to appoint them.

APPENDIX D.

List of Institutions in Union with the Society of Arts, November 3, 1852.

Aberdeen	Mechanics' Institution.
Aberystwith	Literary, Scientific, and Mechanics' Institution
Accrington	Mechanics' Institution.
Annan	Mechanics' Institute.
Ashford	Mechanics' Institute.
Bacup	Mechanics' Institution.
Bakewell and High Peak	Institute.
Barking	Mutual Improvement Society.
Barnet	Institute.
Barnsley	Mechanics' Institute and Literary Society.
Barnstaple	Literary and Scientific Institution.
Basingstoke	Mechanics' Institute.
Bath	Commercial and Literary Institution.
Battle	Mechanics' Institution.
Beccles	Public Library and Scientific Institution.
Bedford	Literary and Scientific Institution.
Belfast	Working Classes Association.
Bexley Heath	Society for the Promotion of Useful Knowledge.
Bilston	Institute.
Bishops Stortford	Literary Society.
Blandford	Institution.
Boston	Athenæum.
Braintree and Bocking	Literary and Mechanics' Institution.
Brechin	Mechanics' Institute.
Brentford	Literary and Scientific Institution.
Bridgewater	Literary and Scientific Institution.
Brighton	Athenæum and Young Men's Literary Union
Brighton	Mechanics' Institute.
Bristol	Athenæum.
Bromley	Literary Institute.
Bromsgrove	Literary and Scientific Institution.
Burnley	Mechanics' Institution.
Bury St. Edmunds	Mechanics', Literary, and Scientific Institution.
Calne	Literary Institution.
Cambridge	Philosophical Institution.
Cambridge and Cambridgeshire	Mechanics' Institute.
Cardiff	Athenæum.
Carlisle	Literary, Scientific, and Mechanical Institution
Carmarthen	Literary and Scientific Institution.
Chatham, Rochester, Strood, and Brompton.	Mechanics' Institute.
Cheadle, Staffordshire	Mechanics' Institution and News Room.
Cheltenham	Literary and Philosophical Institution.
Chepstow	Literary Institution.
Chester	Mechanics' Institution.
Chesterfield and Brampton	Mechanics' Institute.
Chichester	Literary Society and Mechanics' Institution.
Clitheroe	Mechanics' Institute.
Corfe Castle	Mutual Improvement Society.
Cork	Royal Institution.
Crewkerne	Literary and Scientific Institution.
Cupar Angus	Mutual Improvement Society.
Darlington	Mechanics' Institution.
Dartford	Literary Institution.
Dawlish	Literary and General Knowledge Society.
Denton and Haughton	Mechanics' and Literary Institute.
Derby	Mechanics' Institution.

Devizes	Literary and Scientific Institution.
Devonport	Mechanics' Institute.
Dover	Museum and Philosophical Institution.
Downpatrick	Mechanics' Institute.
Dumfries and Maxweltown	Mechanics' Institution.
Dundalk	Mechanics' Institute.
Dunmow, Essex	Literary and Scientific Institution.
Durham	Mechanics' Institute.
Eastbourne	Literary Institute.
Ely	Mechanics' Institution.
Exeter	Literary Society.
Falkirk	School of Arts.
Falmouth	Mechanics' Institute.
Feversham	Literary and Scientific Institution.
Folkstone	Harveian Institution.
Fordingbridge	Literary, Scientific, and Mechanics' Institute.
Gainsborough	Literary, Scientific, and Mechanics' Institution.
Gateshead	Mechanics' Institute.
Glasgow	Athenæum.
Glasgow	Mechanics' Institution.
Gloucester	Literary and Scientific Society.
Grantham	Philosophical Institution.
Grantham	Public Literary Institution.
Gravesend and Milton	Mechanics' Institute.
Greenock	Mechanics' Institution.
Greenwich	Useful Knowledge Society.
Guernsey	Mechanics' Institution and Literary Society.
Guildford	Institute.
Hailsham	Mutual Improvement Society.
Halifax	Mechanics', Institution and Mutual Improvement Society.
Halstead	Mechanics' Literary, and Scientific Institution.
Hastings	Mechanics' Institution.
Hereford	Philosophical and Antiquarian Society.
High Green, near Sheffield	Mechanics' Institution.
Highgate	Literary and Scientific Institution.
Horncastle	Mechanics' Institution.
Horsham	Literary and Scientific Institution.
Huntingdon	Literary and Scientific Institution.
Hythe	Reading Society.
Ipswich	Mechanics' Institute.
Lancaster	Mechanics' Institute.
Leamington	Royal Leamington Literary and Scientific Institution.
Leeds	Mechanics' Institution and Literary Society.
Leeds	Philosophical and Literary Society.
Leeds	Yorkshire Union of Mechanics' Institutes.
Leek	Mechanics' Institution.
Leicester	Mechanics' Institution.
Leiston, near Saxmundham	Mechanics' Institute.
Leven, Vale of	Mechanics' Institution.
Levern and Barrhead	Mechanics' Institution.
Lewes	Mechanics' Institution.
Lincoln	Lincoln and Lincolnshire Mechanics' Institute.
Liskeard	Institution.
Liverpool	Mechanics' Institution.
Liverpool	Bootle Educational Society.
London, Bank of England	The Bank of England Library and Literary Association.
„ Camberwell	Camberwell Athenæum.
„ Leipsic Road, Camberwell.	Camberwell Institute for the Industrial Classes.
„ Aldersgate Street	City of London Literary and Scientific Institution.
„ Hackney	Hackney Literary and Scientific Institution.
„ Sussex Hall, Leadenhall Street.	Jews' and General Literary and Scientific Institution

London, Nine Elms	London & South-Western Literary and Scientific Institution.
„ Cripplegate	London Domestic Mission Society.
„ Southampton Buildings	London Mechanics' Institution.
„ Edwards Street, Portman Square.	Marylebone Literary and Scientific Institution.
„ 65 Carlisle Street, Edgware Road.	Marylebone and Paddington Literary Institution.
„ 74 Grosvenor Street	St. George's, Hanover Square, Lending Library and Reading Room.
„ South Place, Pimlico	St. Michael's Literary, Scientific, and Mechanics' Institution.
„ Walworth	Walworth Literary and Scientific Institution.
„ Great Smith Street, Westminster.	Westminster Literary, Scientific, and Mechanics' Institution.
Longton	Athenæum and Mechanics' Institution.
Loughborough	Literary and Philosophical Society.
Ludlow	Literary Association and Mechanics' Institute.
Lymington	Literary Institution.
Lynn	Conversazione and Society of Arts.
Macclesfield	Society for the Acquirement of Useful Knowledge.
Maidenhead	Mechanics', Literary, and Scientific Institution.
Malton	Literary Institution.
Manchester	Mechanics' Institution.
Manningtree and Mistley	Mechanics' Institution.
Margate	Literary and Scientific Institution.
Marlborough	Reading and Mutual Improvement Society.
Modbury, near Ermebridge	Institution.
Morpeth	Mechanics' and Scientific Institution.
Newark	Mechanics' Institutiou.
Newbury	Literary Institution.
Newport, Isle of Wight	Athenæum and Mechanics' Institution.
Newport, Monmouthshire	Athenæum and Mechanics' Institute.
Newport, Salop	Mechanics' Institute and Literary Society.
Northampton	Mechanics' Institute.
Northampton	Religious and Useful Knowledge Society.
Nottingham	Mechanics' Institution.
Oldham	Lyceum.
Oswestry	Young Men's Institute.
Patricroft, near Manchester	Mechanics' Institution.
Pendleton, near Manchester	Mechanics' Institution.
Pershore	Mechanics' Institution.
Peterborough	Mechanics' Institution.
Plymouth	Mechanics' Institute.
Poole	Town and County Library and Literary Institute.
Portaferry	Mechanics' Institute.
Portsmouth and Portsea	Literary and Philosophical Society.
Prince Town, Dartmoor	Literary Institution.
Radcliffe Bridge and Pilkington	Lyceum and Mutual Improvement Society.
Rawtenstall	Mechanics' Institution.
Reading	Literary, Scientific, and Mechanics' Institution.
Redditch	Literary and Scientific Institute.
Reigate	Mechanics' Institution.
Romford	Literary and Scientific Institution.
Royston	Mechanics' Institute.
Ryde, Isle of Wight	Literary and Scientific Institute.
Saffron Walden	Literary and Scientific Institution.
St. Ives, Cornwall	Institution.
St. Just, near Penzance	Institution.
St. Leonard's	Mechanics' Institution.
Salisbury	Literary and Scientific Institution.
Saltash, near Plymouth	Institute.
Sevenoaks	Literary and Scientific Institution.
Sheerness	Mechanics' Institution.

Shelton, near Newcastle-under-Lyne.	Potteries Mechanics' Institution.
Sherborne	Literary Institution.
Shiffnall	Mechanics' Institution.
Shrewsbury	Church of England Literary and Scientific Institution.
Shrewsbury	Mechanics' Institution.
Skerton	Christian Institution Society.
Sleaford	Public Library.
Slough	Mechanics' Institution.
Southampton	Polytechnic Institution.
Staines	Literary and Scientific Institution.
Staley-Bridge	Mechanics' Institution.
Stamford	Institution.
Stirling	School of Arts.
Stockton-on-Tees	Mechanics' Institute of Literature and Science.
Stoke-upon-Trent	Athenæum.
Stonehouse, near Plymouth	Literary and Scientific Institute.
Sudbury	Literary Institution and Museum.
Tenterden	Mutual Improvement Society.
Tewkesbury	Mechanics' Institution.
Thame	Mutual Improvement Society.
Tiverton	Literary and Scientific Institution.
Trowbridge	Mechanics' Institution.
Truro	Literary and Scientific Institution.
Tunbridge	Society of Literary and Scientific Enquirers.
Tunbridge Wells	Useful Knowledge Institution.
Tyldesley, near Manchester	Mechanics' Institution and Mutual Improvement Society.
Uxbridge	Young Men's Improvement Society.
Wandsworth	Literary and Scientific Institute.
Wantage	Alfred Literary and Scientific Institution.
Ware	Institute.
Wareham	Mutual Improvement Society.
Warminster	Athenæum.
Warrington	Mechanics' Institution.
Warrington	Museum.
Warwick	Athenæum.
Wednesbury	Mechanics' Institution.
Wellingborough	Mechanics' Institution.
West Bromwich	Institution for Advancement of Knowledge.
Whitehaven	Mechanics' Institution.
Wimborne Minster	Society for the acquirement of Useful Knowledge.
Winchester	Mechanics' Institution.
Windsor and Eton	Literary, Scientific, and Mechanics' Institution.
Woburn	Literary and Scientific Institution.
Wolverhampton	Athenæum and Mechanics' Institute.
Woolwich	Literary, Scientific, and Mechanics' Institution.
Workington	Mechanics' Institution.
Wrexham	Literary Institution.
Wrington, near Bristol	Literary Society.
Yarmouth, Great, and Southtown	Young Man's Institute.
Yeovil	Mutual Improvement Society.

(Signed) EDWARD SOLLY *Secretary*.

Society of Arts,
Nov. 3rd, 1852.

APPENDIX E.

Extracts from a Lecture by Dr. Playfair on Industrial Instruction on the Continent.

Industrial Instruction of Prussia.

I would remind you that the secondary education of Prussia is of three kinds; and consists of the *Gymnasia*, or Classical Schools; the *Real* Schools; and the *Gewerbe*, or Trade Schools.

The Gymnasia teach many more *realities* than the Grammar schools of our country, but nevertheless they are chiefly classical. The Real schools profess a general education, like the Gymnasia, but substitute the modern languages for the ancient; preserving, however, Latin, and giving more prominence than the Gymnasia to the physical sciences. In the provinces of the Rhine—in other words, in the chief manufacturing districts of Prussia—the Real schools are the best attended, and perhaps in Berlin also; but, upon the whole, the Gymnasia, which are indispensable for admission to the University, still retain their high position as means of affording a secondary education; and they hold their places more firmly since they have begun to introduce *realities* into their courses. With both these systems, however, I have nothing to do in this Lecture further than to draw attention to the fact, that the general character of all secondary education in Germany is tending towards giving instruction in the wants of the nineteenth century, and not stopping at that considered sufficient in the thirteenth, as many of our classical schools do.

The third system of secondary education, the Trade schools, is, however, directly technical in character. Pupils are not admitted into them until they are fourteen years of age, and therefore it frequently happens that they have had a *real* education previous to their admission. Every pupil before entering them must have had a good primary education in his own language, must thoroughly understand the elements of arithmetic, and the mensuration of plane and solid bodies, and must be able to show that he is a good free hand drawer. The course of instruction consists of two years, and the time given to each object of study is seen in the following scheme:—

Scheme of the Trade (Preparatory) Schools of Prussia.

Under Class (1 year).

	Hours in a week.
Planimetry (plane geometry)	4
Algebra, to equations of the first degree	3
Practical arithmetic	4
Physics	4
Chemistry	4
Free drawing	7
Linear drawing	9
	35

Upper Class.

a. Winter Session.

Continuation of algebra—trigonometry	3
Stereometry and descriptive geometry	3
Practical calculation	2
Mechanics and machinery	
Laboratory work, and repetitions in chemistry and physics	4
Mineralogy	2
Architecture, contract works, and plans	3
Free drawing	7
Linear drawing	9
	36

b. Summer Session.

	Hours in a week.
Continuation of descriptive geometry and conic sections	3
Application of algebra and trigonometry to the solution of questions in planimetry and stereometry—land surveying	3
Practical calculations (extraction of roots, logarithmic practice, and calculations of capacities in bodies)	2
Machinery and mechanical technology	3
Chemical technology	4
Mineralogy	2
Architecture and building plans	3
Free drawing, modelling	7
Linear drawing	9
	36

In looking at the scheme of instruction, you will scarcely remember that these Trade schools are in fact only preparatory to the Central Industrial Institute of Berlin ; but you may naturally inquire—Have such schools arisen in the necessity of the people, or by a political perception of their requirement on the part of the Government ? The answer is, that the Government only grants one-half the funds necessary for their annual support, and that the town in which one is must furnish the rest, and build the school-house. No such school is founded unless upon the petition of a locality for a grant in aid ; so that they are, in fact, upon the same principles as our own Schools of Design, with this difference, that the localities do more and the Government less than in this country. There are now 26* of these Trade schools in Prussia, viz., 7 in the provinces of the Rhine, 5 in Westphalia, 3 in Prussian Saxony, 2 in Brandenberg, 2 in Pomerania, 3 in Prussia Proper, 2 in Silesia, and 1 in Posen. They are therefore situated so as to direct influence on the chief industrial parts of Prussia. The instruction is not gratuitous, the charge varying from thirty shillings to three pounds annually ; and yet about 1,200 scholars are every year receiving the comprehensive technical knowledge offered by these professedly elementary schools. The instruction and examinations are watched by Government, through Commissioners appointed by the Minister of Trade ; and the best pupils have the privilege of passing to the Central Institute at Berlin, to which I have now to refer.

The Trade Institute of Berlin.

The Trade schools of Prussia are chiefly intended for tradesmen or small producers, such as masons, carpenters, well-sinkers, millwrights, &c. ; while the Trade Institute professes chiefly the instruction of engineers, civil or mechanical, architects, and managers of factories and chemical works. The foundation, however, of this Central Institute is different from all others which I have seen on the Continent, and is not likely to be imitated in this country. Not only is its instruction wholly gratuitous, but about 50 out of its 170 pupils receive 30*l.* annually from the Government. The annual cost of the school to the State is 7,000*l.*, of which 1,500*l.* are devoted to the support of poor pupils, and 1,000*l.* are spent in travelling expenses, both professors and students being occasionally sent to foreign countries to acquire a knowledge of recent inventions and new industrial improvements. The chief peculiarity of this institution was its being originally confined to the education of workmen, who, in addition to the principles of their trade, were even taught their mechanical craft in extensive workshops. It is now, however, acknowledged that this was an error, and that the practice of an art can only be learned, satisfactorily, in the workshops of industry. The whole organization of the school has, therefore, been recently changed, and its instruction is now assimilated in character to that given by the other higher industrial institutions of Germany ; but, as its past experience is instructive, I have described its present and former systems in the Appendix. Now the instruction is devoted to the higher class of producers, and among its professors are the well-known names of Drückenmüller, Wolff, Dove, Rammelsberg, Magnus, Wiebe, Fink, Freiberg, Pohlke, Kiss, and Boettlicher. As might be expected from men of such eminence, the character of the instruction, though eminently practical, is at the same time highly scientific. The course of instruction is for three years, and the students, before being admitted, must have a " maturity certificate " from a Secondary school, or submit to an entrance examination. Accordingly, no student comes to this Central College without being well acquainted with the elements of mathematics, physics, chemistry, and drawing. This previous knowledge is of the greatest importance, as it relieves the professors from teaching the elements, and enables them to devote their whole time to the application of the sciences. The course of instruction extends over three years, but in the second and third years the students divide into special branches, adapted to the three divisions of (A) mechanics and engineers, (B) chemists, (C) architects and builders.

* * * *

* Two of them, however, are only in the act of formation, viz., those at Coblentz and Dusseldorf.

The plan of instruction in this school is, to communicate all such information as may be required by a particular manufacturer, although not directly included in the limits of his profession. Thus it is considered necessary that the chemist should be able to construct plans, make estimates, and understand the principles of machinery, in order that he may know how to express his wants to engineers or builders, and be able to see that the contracts are not excessive in price. As the instruction is given gratuitously by the State, only those students are allowed to remain in the institution who give evidence of satisfactory progress. An efficient plan of final examination for the granting of general certificates has not hitherto existed in this school, although now about to be introduced; still the students are in great demand by manufacturers, and it is rare to find men who go out with good-class certificates waiting any considerable time for employment.

In Prussia there are several other technical institutions for engineers, architects, and commercial men; but a description of them is without the limits of my present Lecture.

Saxony.

The Secondary schools of Saxony, like those of Prussia, are of three kinds, viz., Gymnasia, Real, and Trade schools. There are nine Gymnasia,* seven of them being supported by the localities, and two by Government. At present there are only four Real schools,† but three others are being founded. The Trade schools are three in number, and are situated at Cheimnitz, Plauen, and Zittau; they are chiefly supported by Government, the communes finding the locality. The first costs the Government about 1,000*l.* annually; the two latter between 400*l.* and 500*l.* each. Public opinion is still divided as to whether the Gymnasia or Real schools give the best general secondary education, but there is a general agreement as to the advantages of the Trade schools, which are steadily increasing in the number of their pupils. They carry their instruction so far that their pupils may at once pass into the higher division of the

Polytechnic School of Dresden.

This school is placed in a large and handsome building, and is well organized and conducted, although its annual revenue, amounting to 2,600*l.*, is so much less than that of the Industrial Institute of Berlin. The school is divided into three parts, viz., the Under school, the Technical or Upper school, and the Architectural school. It has been found expedient, as in the Institute at Berlin, to make certain fundamental classes common to all students, and then to divide the instruction into specialities, those of the Technical school being—

A. Mechanists.
B. Civil Engineers.
C. Chemists.

The Under part of the school commences generally with students, of sixteen years of age, and lasts for three years. The instruction given is as follows, the number of hours devoted weekly to each subject being given:—

Lowest Division.

CLASS III.

Winter.	Summer	——	Winter.	Summer	——
Hours.	Hours.		Hours.	Hours.	
5	5	Stereometry and Trigonometry.	2	2	Laws of projection.
5	5	Algebra.	2	2	Plan drawing.
4	4	Experimental Physics.	6	6	Ornamental drawing.
3	3	German.	2	2	Natural history or practical geometry.
3	3	French.			

* The Gymnasia are placed as follows: two in Dresden, two in Leipsic, and one in each of the following towns: Freiberg, Zwickau, Bautzen, Meissen, Grima. The two latter are supported by Government, the others being communal.

† There are two Real schools in Dresden, one in Leipsic, and one in Anaberg.

CLASS II.			CLASS I.		
Winter.	Summer	——	Winter.	Summer	——
Hours.	Hours.		Hours.	Hours.	
4	4	Analytical Geometry (in the plane)	4	4	Analytical and descriptive geometry.
5	5	Mechanics.	5	5	Mechanics.
4	4	Theoretical Chemistry.	5	5	Machinery.
4	4	Mineralogy.	3	3	Mechanical technology.
2	2	Architectural Science.	4	4	Technical chemistry.
2	2	Practical Geometry (Class III.)	2	2	German and logic.
3	3	German.	2	2	French.
3	3	French.	3	3	English.
6	6	Machine-drawing.	4	4	Machine drawing and perspective.
4	4	Ornamental drawing.	4	4	Architectural drawing.
4	2	Field Surveying (practical).			
4	2	Plan Drawing.			

In addition to these there are for—

Winter.	Summer	——
Hours.	Hours.	
6	6	A. Modelling in wood, and special hours of instruction in machine drawing.
4	2	B. Field surveying, and continuation of practical geometry.
6	6	C. Larger number of hours in the laboratory.

You have now seen what is considered to be the elementary knowledge requisite for the Upper or Technical division of the school, which the students enter at nineteen years of age, remaining two years. The instruction in this division is now as follows :—

Upper or Technical Division.

CLASS II.			CLASS I.		
Summer	Winter.	——	Summer	Winter.	——
Hours.	Hours.	*For all Students.*	Hours.	Hours.	
5	5	Differential and integral calculus.	4	4	Higher (analytical) mechanics.
3	3	Mechanical technology.	4	4	The higher physics.
2	4	Geology.	4	4	Astronomy.
2	2	German and logic.	2	2	National economy.
2	2	English.	2	2	Popular Jurisprudence.
2	4	Book-keeping.	2	2	German and logic.
½ day	—	Geological excursions.	2	2	English.
		Section A.			*For* A.
3	3	Mill machinery and construction.	3	3	Theory of motive powers.
3	3	Higher geodesy.	9	9	Projection of machines.
9	9	Projection of machines.			
		Section B.			*For* B.
3	3	Higher geodesy.	3	3	Brick and stone-work (methods and contracts).
4	4	Roads, railways, and hydraulic engineering.	1 day	4	Practical surveying. Plan drawing.
1 day	4	Practical working in surveying. Plan drawing.	9	9	Building projections.
9	9	Projection of machines and of hydraulic works.			
		Section C.			*For* C.
12	16	Laboratory practice.	16	16	Laboratory practice.

It will be observed, with some surprise, that the native language, German, forms a part of the instruction, even in the highest class ; and the reason given for this appears to be satisfactory. It was found that mere technical instruction was apt to contract too much the views

of the students, and that they had little inclination afterwards to subjects of general interest; but now, through the German class, the students are kept interested in history and polite literature, so that they go out from the school not less instructed technologists, but more cultivated men. Instruction in the modern languages, besides its technical importance, is also made subservient to this end. The school possesses collections and workshops on a moderate scale, but no large machine workshop, as in Berlin. In the vacation, the students, with the sanction and aid of the Government, are engaged in practical operations; some being placed on the railways to work locomotives and aid in the general traffic, while others are sent to coal-works, mines, iron furnaces, &c., and, generally, under the charge of the Professors. The number of students at the time of my visit was 220, each of them paying 4*l.* 10*s.* annually, except a small number who were excused payment on the ground of poverty; but, in addition to this, there were 27 who devoted their time to drawing and modelling. The number of Professors in the Technical school is 22.

Besides the Technical school, there is, in the same institution, a school of Architecture, possessing 7 professors and 85 students, during the last session. The instruction given was as follows:—

LOWER CLASS.		UPPER CLASS.		REPETITION CLASS.	
Hours.		Hours.		Hours.	
6	Architectural science.	4	Building.	2	Building economy and contract.
5	Arithmetic.	4	Carpentry.		
5	Geometry.	6	Statics and mechanics.	2	Repetition of architecture.
3	Industrial physics.	3	German.	6	Statics and mechanics.
4	German.	2	Ornamental drawing.	2	German.
2	Ornamental drawing.	4	Perspective.	2	Ornamental drawing.
4	Projection.	6	Architectural drawing.	2	Perspective.
6	Architectural drawing.	4	Projection of building plans.	16	Projection of plans.

The "Maturity" examination, which each student must pass before he obtains a certificate, requires very high qualifications on the part of the pupils, and is conducted before a Royal Commissioner, specially appointed for this purpose, and in the presence of numerous persons who are invited to be present.

Austria.

Austria has but lately established the *Real* system of Secondary instruction, which is, therefore, only in course of development; and, as yet, she has no Trade schools corresponding to those of Prussia and Saxony. On the other hand, she has several provincial Polytechnic colleges, viz., in Pesth, Prague, Gratz, Brun in Moravia, and Lenberg in Galicia; the number of students at these amounting to about 4,000. In all of them the standard of instruction is said to be high; but I have not seen them. I must, therefore, confine myself to the Polytechnic school at Vienna, one of the largest institutions of this kind in Germany, the number of students of the Systematic part of the school being, at the time of my visit, 1,637. The State gives from 60,000 to 80,000 florins annually for its support, and the school funds amount to about 30,000 more, so that the total revenue may be taken at between 10,000*l.* and 11,000*l.* The education is gratuitous; the only sum charged being a matriculation fee of 8*s.* There are only about 25 exhibitioners, who receive sums varying from 10*l.* to 20*l.*

The organization of this institution is peculiar, and requires a little explanation. It is divided into four sections proper, and one section for popular instruction; these sections are:—

A. *Technical*, comprising the physical and mathematical sciences, in their industrial application.
B. *Commercial*, for instruction in all matters involved in the occupation of a merchant.
C. *Preparatory Division*, for the instruction of those who have entered without sufficient preliminary knowledge.
D. *Trade Drawing*.
E. *Popular Section*, for instructing workmen ou Sundays and holidays.

With regard to the last section, I may observe that the habits of foreign nations on Sunday have led to the formation of Sunday-schools, for secular and not for religious knowledge: and these I found in every large town on the continent. Last year the attendance of workmen at the Sunday-school in connexion with the Polytechnic Institution at Vienna was as follows:—

For mathematics	190
Mechanics	116
Experimental physics	211
Chemistry	133
Drawing	731

Besides this general instruction on Sunday, there are extraordinary lectures in mathematics, German, French, English, Bohemian, Turkish, Italian, and stenography.

In Section D, or Trade Drawing, there are seven professors, and the instruction extends from four to five hours daily. The attendance at the time of my visit was as follows:—

Preparatory drawing - - - -	184
Manufacturing drawing - - - -	86
Drawing for metal work - - - -	76
Machine drawing - - - -	14

As respects the three systematic sections of the institution, the course of instruction generally lasts for five years. The student being in his sixteenth year before he enters the Technical division, must show evidence of possessing a sufficient amount of elementary knowledge.

* * *

The collections of this institution are ten in number, and well adapted for the purposes of study. The models for these are made by workmen on the premises, but there is no general workshop as in Berlin. The laboratory is well arranged, and consists of several rooms admirably fitted up, a special allowance of 120*l.* being annually made for the purchase of material, &c. The number of professors, teachers, and assistants in the institution amounts to 58, exclusive of the house staff. It will, therefore, be apparent, that the institution is on a large scale, and that the instruction is comprehensive in its character, although not so systematic as in some of the other German schools. The examinations for certificates are not made in the regular or open manner of those to which I have already alluded; but it is understood that new regulations with regard to them are under consideration. Nevertheless, I was assured by Chevalier de Burg, the late director, and Professor Redtenbacher, that, notwithstanding the large number of students, the demand for them, by industrial establishments, is greater than can be readily supplied.

Bavaria.

In Bavaria there are no Real schools, and only a few of the Gymnasia introduce realities into their courses; but there are 26 Trade schools, or, in fact, one such school for every large town. I find by the statistics of 21 schools, which I have obtained, and proportioning for the five, of which I have no account, that there are above 3,000 pupils annually obtaining the high education given in these Trade schools. The schools are supported by the Commune, aided, when necessary, by the Province. The management of the schools and appointment of the professors rests with the locality; but the Government exercises a supervision, and sends Commissioners annually to examine and report upon them to the Minister of Trade. The courses extend over three years; and as the entrance age is twelve, the pupil at fifteen may pass into the higher Polytechnic Colleges. Of these there are three, one being in Munich, another in Nuremberg, and the third in Augsburg. They are chiefly supported by Government, which allows, however, only 39,000* Bavarian florins, or 3,250*l.*, for their support; and the number of pupils amounts to 481, the professors being 34 in number. In addition to these higher Polytechnic schools, there are two Commercial schools, also supported by Government (at Nuremberg and Furt), and there is a Building school at Munich, which is chiefly intended for the instruction of master masons and carpenters. Besides these, there are Industrial schools for workmen on Sundays and holidays; and the pupils attending them cannot be less than from 8,000 to 10,000.

The system of industrial instruction in Bavaria dates from 1833, and so satisfied is the Government with its effect that it continues to support and extend it with great liberality. It would be impossible in this Lecture to describe to you the details of the systems of instruction pursued, even in each of the three Head Colleges; and I confine myself to simply giving you the scheme of the Munich institution, referring you to the Appendix for fuller descriptions. I ought, however, to state, that it would require a union of all three Colleges to make really one Polytechnic Institute; as each of them practically, though not professedly, gives a leaning to particular special branches of the Arts; thus, Munich chiefly devotes itself to civil engineers and architects; Augsburg, to mechanists; and Nuremberg, to chemists. I confine myself, however, to the institution at Munich, as an illustration: it is situated in a large and commodious building, possesses admirable collections, especially one of physical apparatus, and has a modelling and sculpture workshop in great activity. The number of its professors and teachers is 16, and of pupils 307, of whom 83 are foreigners. Its course of general instruction extends over three years, but engineers take a special fourth year's course.

Certificates of proficiency are granted, the examinations being made before a Royal Commissioner, who has to report to the Board of Trade on the efficiency of the institution. The architecture of Bavaria, and the excellent engineering which is observed there, is said to be, in a great measure, due to this school; and it is undoubted that its pupils are in great demand, and fill important positions in industry.

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* Munich receives 18,000 florins, Augsburg 9,000, Nuremberg 12,000; and, in addition, they may receive from 800 to 1,200 florins (1 florin = 1*s.* 8*d.*) each from pupils.

Grand Duchy of Baden.

In the Duchy of Baden, the Secondary schools are of three classes, the Gymnasia, the High *Bürger*, and the Trade schools, but the latter do not possess the same high standard of instruction as in other places; and the students of the *Bürger* schools form the food of the Great Polytechnic Institution, while the Trade schools are chiefly devoted to the education of workmen. The Polytechnic school of Carlsruhe is perhaps the most efficient one in Germany; and as its constitution and organization are more nearly allied to any similar institution that might arise in this country, I must enter into its description somewhat in detail. The school is now about 18 years old; but its present state and organization have resulted from the experience of the last ten years. It has two main divisions, viz.:—

A. Preparatory section, consisting of three mathematical classes.
B. The *Fach* schools, or schools of specialities, consisting of—
   a. Engineering.
   b. Architecture.
   c. Forestry.
   d. Chemistry and technology.
   e. Mechanical technology.
   f. Commerce.
   g. Post-office.

The Polytechnic school is under the Minister of the Interior, and is managed by a director, annually elected by the professors from among themselves, and by another self-elective machinery, which appears to be unnecessarily complicated.

a. A special council of teachers, consisting chiefly of the principals of the Special schools.
b. A general council of all the teachers.
c. An executive council.
d. An auditor.
e. A secretary.

Although there are seven Special schools, several of the professors teach in more than one; but dividing them into their respective sciences, we find the following large staff of teachers:—

Mathematics	7	Drawing	2
Natural and physical sciences	5	Ornamental writing	1
Architecture	6	Modelling, carpentry, and machine working	3
Engineering	2	General subjects	10
Forestry	3		
Sculpture	2		

Thus there is a staff of 41 teachers to about 330 students, of whom 112 were foreign to the Duchy, 40 not being of German origin. This institution differs from most schools in Germany by being to a great extent self-supporting, the Government grant being only 32,000 florins, while the expenses are above 50,000 florins. It does indeed seem extraordinary that with a revenue of little more than 4,000*l.* (4,166*l.*), this institution is able to accomplish as much as it does. The cost to each student is about 6*l.* annually.

* * * *

You will observe, however, that this institution differs from all those which we have already examined by splitting its instruction into seven different specialities, and that therefore it deserves the name of a Polytechnic Institution more than the others. The mode of instruction in all the schools is by lectures, practical working in the laboratory, the carpentry and machine shops, and in surveying; while at the same time examinations and repetitions are very frequent. The formal certificates of the Special Technical Schools are said to be in the highest estimation, and command immediate employment to the possessors.

I have now concluded the description of the Industrial schools of Germany, so far as my personal knowledge extends. There is, however, an excellent Polytechnic Institution in Hanover which I have not had time to visit, and therefore regret that I am obliged to omit its description. Reviewing what has been said, and adding a fair proportion for the districts not visited, it is quite certain that at least 13,000 students* are being every year systematically instructed in the industrial institutions of Germany; and when you consider the character of that systematic instruction, if you agree in the general argument with which the Lecture commenced, you will be convinced, that the time has come when England must begin to raise an intellectual force to do battle with that mighty one which is rising elsewhere. But I must now pass to France, our worthy rival in industry.

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* This is exclusive of the workmen in the Industrial Sunday schools. The number of pupils at these cannot be under from 30,000 to 40,000, although I give this number only as an approximative estimate made from the proportion of systematic pupils to Sunday pupils in the schools from which I have obtained the statistics. For a popular explanation of these schools, and their general effect upon industry, I would refer to Zschokke's excellent little volume, "Labour stands on Golden Feet."

France.

It is well known that France encourages to a great extent the industrial instruction of its producers. The *Ecole Polytechnique* of Paris, the *Ecole des Ponts et Chaussées*, and the *Ecole des Mines*, have been too often described to require more than a passing reference to them. But as they are chiefly for the instruction of Government *employés* they do not necessarily act immediately on private production. At the same time, it is not to be forgotten that it is the principle of the French Government to act upon its own perception of right by instructing the population, even before formal demands have been made on the part of the public, for the benefit which is thus conferred. It is, therefore, the more surprising, that the middle classes for some time urged their want of an institution for the industrial instruction of their producers, without carrying conviction of its necessity to the Government. Impelled by the urgency of the want, a private institution was raised; and the feeling in its favour was sufficiently strong to induce a capitalist to embark a large sum of money in founding it. This private institution, raised in a capital where the public schools are altogether under the Government, proved that it was a necessity of the times, by its immediate and eminent success. Thus rose the *Ecole des Arts et Manufactures*, now the most important industrial institution in France. It possesses the most eminent men of France as its professors, and it has reared those who promise to be her future brightest ornaments. As a commercial speculation it has been singularly successful, and it still remains under the business direction of the original enterprising capitalist, M. Lavallée. The Government now gives to it a certain number of exhibitions to educate poor students of extraordinary talents, and the Councils-General of twenty-nine departments of France also do the same. The appreciation of its importance to France may best be seen in the Report of the Commission of the Chamber of Deputies appointed to inquire into the budget:—

"You know, gentlemen, this useful establishment, founded in 1829, by the association of eminent professors, with the intention of forming civil engineers, the directors of works, the chiefs of workshops and factories. This private institution, which by its importance rivals in excellence our first public establishments, has created and put in practice a complete system of industrial education. It is at the same time a supplement to our Polytechnic School, and an addition to our various applied schools. Such an institution ministers to one of the first necessities of the age, therefore its success is complete. This is confirmed both by the unanimous opinion of the first manufacturers of the country, and by the ease with which all the pupils educated at it have received employment.

The school possesses 40 professors and teachers, and 300 students, each of whom pay 36*l.* annually. The number of the latter is only limited by the size of the building, and it is in contemplation to remove to one considerably larger. The courses extend over three years, and are compulsory on all, but in the second year the practical operations divide into two parts, the one general, and the other applicable to one of the four following specialities:—

A. Mechanists.
B. Engineers.
C. Metallurgists.
D. Chemists.

Students are not admitted until they are eighteen years of age, and they must furnish proof of possessing a good elementary knowledge of the sciences. The courses of instruction are as follows:—

YEAR I.	YEAR II.	YEAR III.
Descriptive geometry.	Descriptive geometry.	Steam engines.
Analytical geometry and mechanics.	Industrial physics.	Railways.
Transformations of motion.	Mechanics.	Hydrostatics.
Physics (general).	Materials used in construction of machines.	Construction of machines.
Chemistry (general).	Analytical chemistry.	Chemical preparations and organic analysis.
Chemical manipulation.	Industrial mineral chemistry.	Industrial organic chemistry and agriculture.
Hygiene and natural history applied to the arts.	Public works.	Architecture.
Drawing.	Geology.	Mining.
	Manufacture of iron and steel.	Furnaces and foundries.
	Technology (cordage, textile materials, cutting wood, stone, &c.).	Technology (mills; oil-making; spinning; felting; milling; potteries, &c.).

It will be seen by the above scheme, that after the first two headings in the second and third years the subjects are parts of corresponding courses, and in practice they are professed every alternate year to the second and third years' students combined. The greatest attention is paid to drawing and design, and much time devoted to it. The students have to

make plans to prove their progress ; as, for example, a beet-root sugar factory is wanted ; the student, from his knowledge of the conditions of the manufacture, must draw out a plan of works, giving estimates, &c., of its cost. Certificates of proficiency are granted after the most severe examinations extending over many days. I was fortunate enough to be present while these were proceeding, and admired the extent and accuracy of the information possessed by the pupils. But you will ask for the proof of the efficiency of this kind of education for manufacturers ; and I reply by stating, that a certificate from this institution is equivalent to assured success in life. Its pupils invariably pass into the most important positions in industry, and not only France, but Spain, Belgium, and England, have learned to value them, as we see by the ready manner in which manufacturers of these countries secure their services. Allow me to give you a few statistics of about 550 of the certificated students, whose occupations are so important that their histories can be traced.

Of this number the following division may be made, all of the occupations being high and responsible :—

Agriculture	18	Chemical arts	57
Architecture, canals, &c.	39	Civil engineering, &c.	56
Railroads	119	Machinery	30
Professors and teachers	42	Metallurgy and mining	79
Textile manufacturers	36	Paper, commerce, salt-works	22
Public works	53		

But the question of its utility may be put in another way : if foreign countries find the pupils of this institution useful, do they send over their own sons for instruction ? To this I reply, that more than 600 foreigners have been educated at this school, and, in analysing its books for statistics to this effect, I was surprised to find, in addition to representatives of the known industrial countries of Europe, numerous students both from North and South America, from Turkey, the Antilles, Hayti, the Mauritius, Madras, Ceylon, Gibraltar, &c. Spain and Belgium send over regularly considerable numbers to this school, and England this year has five or six of her subjects who were obliged to go abroad for that comprehensive instruction which they could not get at home. Experience has shown that it is precisely those countries which do not possess a system of industrial instruction that send the largest proportion of foreigners to be educated there.

Besides this institution, which is devoted to the industrial instruction of the middle classes, you all know of that princely establishment the *Conservatoire des Arts et Métiers*, the object of which is, both by its splendid museums and by the lectures of the eminent men who profess there,—and of whom it is only necessary to mention the names of Morin, Dupin, Pouillet, Peligot, Moll, Blanqui, Wolowski, Regnault, and Payen,—to instruct the working classes in industrial science, and to draw public attention to all new discoveries in industry.

This institution is, however, so well known by its beautiful and instructive collections, that I am spared the necessity of describing them.

Under Colonel Morin, the distinguished director, who has introduced such life and activity into the Conservatoire during the last few years, there are three provincial industrial colleges, each supported by Government at an expense of 300,000 francs, or 12,000*l*. These colleges are situated at Chalons, Angers, and Aix, and contain between 200 and 300 students each, who are boarded and educated at the public expense. The students are of a lower class than those who go to the *Ecole Centrale*, and are educated chiefly as men who may aspire to be master workmen. Accordingly, five hours every day are devoted to study, and seven hours to the workshops. Many of the pupils of these institutions obtain Government employment, and those who have passed their examinations find ready occupations as foremen, draughtsmen, and clerks of works. I have not personally seen these provincial schools, but in conversation with Colonel Morin, the present director, I have been assured of their high state of efficiency.

Belgium.

In a lecture on Continental industrial instruction it would be wrong to omit allusion to this important producing nation, but I have not recently visited its institutions. The Belgian Government, however, accepting the lesson of tbe Exhibition, and being convinced of the necessity of industrial instruction to its producers, has recently sent Commissioners to various countries for the purpose of inquiring into the subject, with the view of immediately establishing a College at Antwerp, and perhaps also at Brussels. Only a few months since M. de Cocquiel made an educational tour in this country, on behalf of the Government ; and he could not conceal his astonishment at the character of the instruction with which we had contented ourselves in this country of production. Belgium, however, though it has depended hitherto to a great extent upon the educational resources of the *Ecole Centrale* of Paris, nearly 100 of its manufacturers having been educated there, has not at the same time been altogether negligent in this direction. The University of Liège has special schools of mines, of arts and manufactures ; and these have been in operation since 1838. The pupils are admitted to them only after a strict examination in proof of their having the necessary elementary knowledge.

* * * *

It is therefore obvious that Belgium cannot be classed as a country which has neglected the industrial instruction of its producers, although it is now about to give it a fuller and more efficient development.

I have now only a few words to say with regard to other countries, because, with the exception of Denmark, I have no personal knowledge of their industrial institutions. In Madrid there is an institution and museum similar to the *Conservatoire des Arts et Métiers*, but for the systematic instruction of the middle class of producers the *Ecole Centrale* of Paris is still used by Spaniards.

With regard to Scandinavia it will not be necessary to detain you long. It is well known that there is an excellent institution in Stockholm which has exercised the most material influence on Swedish industry ; but though anxious to inspect it this year, I found that the time at my disposal would not permit me to do so. In Denmark the secondary education is tending much to the Real system, although there is at present an excellent combination of classical learning with *realities* in the Gymnasia. The Polytechnic Institution of Copenhagen was founded in 1829, and is chiefly supported by Government, which gives 12,000 rixdollars annually, while the fees of the students amount to about 2,000 more. The total revenue of the institution does not therefore reach 1,600*l*. The number of students is not great, there being at present only 44 matriculated " polytechnics," and about 60 other students attending special lectures, while there are 9 professors.

* * * *

I would refer to the Appendix for the account of a most interesting institution, named "The Technical Institute of Copenhagen," which is chiefly devoted to the instruction of workmen, of whom 520 were in regular attendance when I visited it. The institution is, in fact, a school of design, but is remarkable for the detailed applications of art, there being a class for almost every trade ; as, for example, for brick-builders, carpenters, cabinet-makers, tin-plate-workers, lock-makers, gas-fitters, goldsmiths, bookbinders, carpet-makers, &c. But besides design, mathematics, physics, the nature of building materials, and other subjects of a like nature, are taught. This is an institution supported by private subscriptions, and the expenditure does not amount to 400*l*. annually.

Before concluding, it may be useful to draw attention to some general points of interest in the systems of instruction which we have examined. In all of them there are differences with regard to the mode of giving instruction, but they are almost uniform in the feeling that the object of Industrial schools is only to teach a pupil how to become an intelligent manufacturer, without attempting to make him one. They content themselves with communicating to him a knowledge of the principles upon which his technical art depends ; but for its practice he must go to the workshops of industry. Some of the institutions, as, for example, the " Trade Institute of Berlin," endeavoured at one time to teach practice in workshops attached to the institution ; but this plan, as might have been anticipated, was found to be of little advantage, and it is now abandoned by almost all the schools, only one or two being still found hovering on the outskirts of this error. In addition to the folly of attempting to teach the practice of an art within the confines of an institution chiefly devoted to other objects, it was found to be highly detrimental to the progress of the students, who were glad to escape from the mental labour of the classes to the muscular labour of the workshops.

This is the point upon which the producer and the promoter of industrial instruction are likely to disagree, unless they thoroughly understand each other ; and I am therefore anxious that there should be no mistake on this subject. We do not think that such schools can substitute a practical training in the workshops, the factory, or the office of the engineer ; but we do think, that a producer possessing a knowledge of natural forces will become a practical man in a shorter time than without it, and that he will know how to turn his practice to the best account. Let me instance the case of a surgeon, as an illustration : for a long time surgery was only an empirical art, carried on by monks and Jews, until the Council of Tours, in 1163, prohibited the former from operating, and then it fell into the hands of barbers and smiths. No one doubts that much useful experience was acquired by them ; and their empirical experience was converted into a system when Edward IV. allowed no one but barbers to practice in London. It was not till the eighteenth year of George II. that barbers and surgeons were finally separated from each other, and that the latter were allowed to fix the standard of their own qualifications. All the fears expressed by manufacturers now were expressed by the barbers on the eve of their separation from the surgeons ; and so alarmed were the former for the safety of the public in the hands of the latter, that they got a provision introduced in the final deed of separation by which surgeons are strictly prohibited from exercising " the feat or craft of barbery and shaving." But does history tell us of any dread evils which arose from giving surgeons more of a scientific and less of a rule of thumb education ? No one ever dreamt of turning out a young man from a lecture-room as a ready-made surgeon ; he must have had hospital practice before he is launched into his profession, and much general practice before his course in life is assured. But it is not now pretended by any one that his education in science renders him less fit to avail himself of the experience of this practice ; on the contrary, it is admitted that it is essential for him, and that he

benefits more by the practice than he would have done had he not had the science. The quack or the empiric depends upon experience alone, and often works real cures, but he fails as often, because he is ignorant of the cause of his success, and an application of the same practice under other conditions may produce fatal results. "Science renders the powers of nature the servants of man, whilst empiricism subjects man to their service. The empiric, placing himself on a level with an inferior or unconscious being, employs but a small portion of his power for the advantage of society. He permits effects to govern his will, whilst, by a true insight into their hidden causes, he might govern them."—*Liebig.*

* * *

The promoters of industrial instruction do not, therefore, offer it as a substitute for practical training, but consider it to be a means by which the latter can be made more efficacious. They do not think that the seed will grow, unless the land is well tilled by the practical farmer, but they offer to manure the land first, and the ploughing-in the manure will enrich the soil and render it more productive.

Another point, common to the higher industrial institutions abroad, is, that they do not communicate elementary knowledge in science, but only teach its applications to industry. They originally experienced the same evil that we have at present in this school, that the pupils came untrained in science, and that the time was spent in teaching its elements, instead of its applications. But gradually raising their standard of knowledge for admission, the public perceived what was required of them, and came with sufficient preliminary acquirements. Some idea may be formed of the state of education by the fact, that pupils are not generally admitted into the Upper Technical class of mechanics, physics, and machinery, unless they have passed examinations in integral and differential calculus. This condition for admission has a twofold advantage; first, that it enables professors to devote all their time to the industrial applications of science; and then that the Industrial institutions, instead of acting as antagonists to those for general education, actually give them the greatest impulse, and are their most powerful supporters.

We must also observe the favourable results which arise from the close connexion of the sciences and of art in the same institution. Mathematical science is not studied and kept apart as a separate branch of knowledge, as is too frequently done in some of our most important schools and colleges, but she is used as the handmaid and interpreter of all the other sciences, and even of art; and it is with this view that so much time is devoted to her study. Perhaps Aristotle was too limited in his views when he said, "Physics and mathematics make practice;" but Bacon was certainly not in error when he wrote "For as physical knowledge daily grows up, and new actions of nature are disclosed, there will be a necessity for new mathematical inventions." And what a commentary on this text is our present knowledge in astronomy, navigation, logarithms, surveying, the theory of tides, the wave theory of light, the attraction of spheroids, and the mass of the earth! In all the courses of the institution, even in architectural and machinery drawing, mathematics give powerful aid. Drawing, in the same way, is used throughout the courses as a handmaid to every science and art, and is not kept in an isolated position, as in our Schools of Design. Hitherto the practice in them has been to teach students to draw, though it is difficult to know how they could be taught to design for arts, regarding which they have had no instruction either as to their wants or their resources*. Abroad, the Schools of Design form part of the Schools of Industry. In our country we are doing much in a fragmentary and dispersed way, which a little union and system would make far more important to industry than it is now.

The comprehensive system of instruction pursued abroad is found to have a most happy effect on the future career of the student. The manufacturing chemist leaves the school with a sufficient knowledge of the principles of machinery to guide him in its management, or to aid him in the expression of his requirements. He can plan and sketch the buildings, machinery, and apparatus which he may require, and he has been taught enough of building and contract work to know whether the plan of the architect is sufficient, and the charges of the builders within moderation. The architect does not end his education with drawing elevations and planning interiors; but chemistry and physics have shown him how to test the qualities of his building materials, and have taught him the principles of ventilation, lighting, acoustics, and drainage, while mathematics enable him to calculate the stability of his structures. These illustrations are sufficient, because the schemes of instruction indicate the knowledge which it has been found advantageous to communicate to the producer in each art.

The mere fact that industrial schools are increasing abroad, and that the number of their pupils is constantly augmenting, is of itself a sufficient proof of their influence on industry, even had we no proofs more direct than these. But it is, indeed, extraordinary that the proofs are already so palpable; for it might have been expected that, at least, the time of one generation would have been required to develop their effects. The interests of a nation extend much beyond the interests of the one generation which forms its present population, and the statesman will feel sure that the effects already in action will operate with a much increasing power in the future.

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* Mr. Cole, the present enlightened superintendent of the department of Practical Art, has begun to medy the defect as far as regards the Central School.

APPENDIX F.

RETURN exhibiting the ANNUAL EXPENDITURE on the undermentioned NATIONAL INSTITUTIONS, as shown by the ESTIMATES for 1852-53, and Voted last Session.

	£.
British Museum (Establishment) - - - -	52,343
(New Buildings) - - - -	21,350
,, (Purchases, &c.) - - - -	2,966
National Gallery - - - - - -	2,495
Museum of Practical Geology (exclusive of Geological Survey 5,500*l.*, and Museum of Irish Industry 3,348*l.*)	6,072
Department of Practical Art (exclusive of Provincial Schools 7,870*l.*) - - - - - -	10,050
Total - - -	£95,276

APPENDIX G.

CORRESPONDENCE between H. R. H. PRINCE ALBERT and the SOCIETY of ARTS, respecting the delivery of a series of LECTURES on the results of the EXHIBITION of 1851.

(1.)

SIR, *Windsor Castle, October* 15, 1851.

I AM commanded by His Royal Highness Prince Albert to request that you will have the goodness to submit the following suggestion for the consideration of the Council of the Society of Arts.

Connected as the Society have been with the original idea for the formation of such an Exhibition as that which has just closed, and with the preliminary arrangements for carrying it into effect, His Royal Highness is sure that they will have taken the warmest interest in its further progress and development, and that they will wish to continue, to a certain degree, their connexion with it, by aiding, as far as in them lies, in the attainment of those advantages to art and industry which it was the object of the Exhibition to endeavour to procure.

Nothing would tend more, in His Royal Highness' opinion, to the accomplishment of that object than a series of lectures given under the direction of the Society of Arts, at their weekly evening meetings, on the probable bearing of the Exhibition on the various branches of science, art, and industry.

The lecturer in each branch being selected for his special knowledge and proficiency in it, it should not be his object to show the results to be expected from the Exhibition on art and industry *generally*, but its probable immediate effect on the particular subject of his lectures; and on this he should state his opinion freely and without reserve.

Among the subjects of such lectures I may enumerate the fine arts, chemistry as applied to manufactures, special processes of manufacture, mechanics, railroads, agriculture, tools and implements, commercial relations, political economy, &c., &c., &c.

Differences of opinion would probably be found to exist among the lecturers on these different subjects, as to the effect to be expected from the Exhibition; but as each lecturer would confine himself to a particular subject, and give the result of his own reflections on that subject only, this would be of little importance.

Such lectures could not fail to direct attention most beneficially to these important studies; and His Royal Highness believes that the Society of Arts, in instituting them, would be adopting the surest method of turning the Exhibition to good account, and would still further identify themselves with a scheme which had for its object, not the gratification of a passing curiosity, but the continued improvement and advance of science, art, and industry.

I have the honour to be, Sir,
Your obedient Servant,
C. GREY.

George Grove, Esq.,
&c. &c. &c.

(2.)

Resolutions passed at a Meeting of Council held on Monday, October 20.

That the Council heartily affirm His Royal Highness' recognition of their having always taken the warmest interest in the progress and development of the Exhibition, and of their wish to continue their connexion with it.

That they receive with gratitude His Royal Highness' letter, as a mark of his confidence that the Society may be made an instrument for perpetuating many of the beneficial results originated by that event.

That the Council fully concur in the valuable suggestions made by His Royal Highness, and will proceed to take the necessary steps for carrying them into effect without delay.

(3.)

MY DEAR SIR, *Windsor Castle, October* 22, 1851.

THE Prince sees no objection to my letter being printed for circulation among the members of the Society of Arts.

He desires me to add that, in carrying out his suggestion, everything will depend upon the proper selection of lecturers; and he trusts great care will be taken to secure, if possible, the assistance of the most able and eminent men in their several branches.

I remain,
Yours faithfully,
C. GREY.

George Grove, Esq.,
&c. &c. &c.

List of the Lectures delivered accordingly.

First Series.

No. 1. *Nov.* 26, 1851.—Rev. W. Whewell, D.D., F.R.S., Master of Trinity ; Inaugural Lecture, "The general bearing of the Exhibition on the progress of Art and Science."

No. 2. *Dec.* 2.—Sir Henry de la Beche, C.B., F.R.S., "Mining, Quarrying, and Metallurgical Processes and Products."

No. 3. *Dec.* 10.—Professor Richard Owen, F.R.S., "Animal Raw Products, used in the Arts and Manufactures."

No. 4. *Dec.* 17.—Jacob Bell, Esq., M.P., "Chemical and Pharmaceutical Processes and Products."

No. 5. *Jan.* 7, 1852.—Dr. Lyon Playfair, C.B., F.R.S., "The Chemical Principles involved in the Manufactures shown at the Exhibition, as a proof of the necessity of an Industrial Education."

No. 6. *Jan.* 14.—Professor J. Lindley, F.R.S., "Substances used as Food."

No. 7. *Jan.* 21.—Professor Edward Solly, F.R.S., "The Vegetable Substances used in the Arts and Manufactures, in relation to Commerce generally."

No. 8. *Jan.* 28.—Rev. Professor R. Willis, F.R.S., "Machines and Tools for working in Metal, Wood, and other Materials."

No. 9. *Feb.* 4.—James Glaisher, Esq., F.R.S., "Philosophical Instruments and Processes."

No. 10. *Feb.* 11.—Henry Hensman, Esq., "Civil Engineering and Machinery generally."

No. 11. *Feb.* 18.—Professor J. Forbes Royle, F.R.S., "The Manufactures of India."

No. 12. *March* 3.—Captain Washington, R.N., F.R.S., "Shipping, particularly Life Boats."

Second Series.

No. 1. *March* 10, 1852.—John Wilson, F.R.S.E., F.G.S., "Agricultural Products and Implements."

No. 2. *March* 17.—James M'Adam, Jun., Esq., Secretary to the Royal Irish Flax Society, "The Cultivation of the Flax Plant, and the various modes of preparing its Fibres for Manufacture."

No. 3. *March* 24.—Professor James Tennant, F.G.S., "Gems and Precious Stones."

No. 4. *March* 31.—Thomas Bazley, Esq., Member of the Royal Commission, "Cotton as an Element of Industry; its confined supply; and its extending consumption by increasing and improving agencies."

No. 5. *April* 7.—S. H. Blackwell, Esq., F.G.S., of Dudley, "The Iron-making resources of the United Kingdom."

No. 6. *April* 14.—Professor George Shaw, Queen's College, Birmingham, "The Glass Manufacture."

No. 7. *April* 21.—M. Digby Wyatt, Esq., "An Attempt to define the Principles which should determine Form in the Decorative Arts."

No. 8. *April* 28.—Owen Jones, Esq., "An Attempt to define the Principles which should regulate the employment of Colour in the Decorative Arts."

No. 9. *May* 5.—Henry Forbes, Esq., of Bradford, "The rise, progress, and present state of the Worsted, Alpaca, and Mohair Manufactures of England."

No. 10. *May* 19.—Professor D. T. Ansted, M.A., F.R.S., "Non-metallic Mineral Manufactures."

No. 11. *June* 2.—L. Arnoux, Esq., "Ceramic Manufacture, China, Porcelain, Earthenware, &c."

No. 12. *Dec.* 1.—Henry Cole, Esq., C.B., "The international Results of the Great Exhibition."

APPENDIX H.

Copy of Memorial addressed to Her Majesty by the Royal Academy in May, 1851.

To the Queen's Most Excellent Majesty.

We, the President and Council of the Royal Academy of Arts, humbly approach Your Majesty, and respectfully request Your Majesty's attention to some circumstances affecting the condition and objects of an Institution which owes its prosperity and usefulness to the favour of the Crown. Understanding that a measure is in contemplation having for its purpose the removal of the works of Art in the present National Gallery to a site better adapted for their preservation, we consider that, in the event of such removal, an opportunity may present itself for affording to the Royal Academy that amount of accommodation as to space which the Establishment requires, and for want of which its efficiency is at present greatly restricted. We, therefore, beg leave to submit to Your Majesty a statement of the position in which the Institution is placed.

The chief inconveniences of the description referred to, to which the Royal Academy is now subjected, are—

1st. Want of room for the schools.

2nd. Want of room for the Annual Exhibition, especially for the exhibition of Sculpture.

3rd. Want of room for the accommodation of the officers of the Academy.

1st. It is not generally known that the Annual Exhibition of works in Painting and Sculpture takes place in the very rooms which are appropriated at other seasons to the instruction of the students. The room in which Sculpture is exhibited is the Antique Academy, where students draw from casts from the antique statues; and in order to prepare the room for the reception of Sculpture during the Exhibition, those casts require to be periodically removed, and subsequently replaced, such removals seldom occurring without some accidents to the casts.

The room appropriated to the Exhibition of Miniatures is one of the schools for Painting; and the large room adjoining it, called the West Room, is another of those schools. It follows that during four of the most valuable consecutive months, the schools above referred to are of necessity closed. If there were space sufficient for the schools independently of the rooms required for the Exhibition, the interruption might be avoided, and might be reduced to a reasonable vacation as at other seasons.

The school for drawing from the living model, called the Life Academy, is confined to a space, the narrow limits of which can be judged of even from the exterior of the building. It is comprised in the dome over the portico, having a most inconvenient access to it. It is much too small for students in drawing, and absolutely unfit to accommodate students in modelling; and, from its situation and the want of space, is also unhealthy.

The dimensions of the room applied to the uses of a Library are much too small to receive the valuable contents which are now deposited in it, and with every wish on the part of the Academy to add to such means of instruction for the use of the students, it becomes extremely difficult to do so for the reason assigned.

There is no efficient school for Architecture provided in the Academy, from the want of a proper room, and from the insufficiency of wall surface on which to display the fine collection of architectural casts which the Academy possesses; neither is there any room for the Exhibition of Architectural Designs. The pictures, models, and drawings required by the Rules of the Academy to be deposited by members on receiving their diplomas as Royal Academicians form now, from their number, an important and interesting Gallery of British Art, and, if a proper room could be appropriated to them, they might be exhibited to the public; instead of which, they are now necessarily covered over during the time of the Exhibition.

All the above defects are to be considered as interfering directly with the efficiency of the Academy as a School of Art; and while the professors, teachers, and visitors devote their time to impart to the students needful instruction, they have constantly to regret the local impediments which obstruct their efforts.

2nd. The number of works of Art annually excluded from the Exhibition of the Royal Academy amounts to several hundreds. In the present year, the number not received equals that of the works admitted. It is by no means to be supposed that this exclusion takes place in the majority of cases from the want of sufficient merit. Were there two or even three more rooms like the larger rooms of the Academy, they could be well filled with pictures and drawings of great merit. With regard to drawings, a number of artists wait only for the

moment when the Academy can provide more space, to send works which would greatly add to the interest of the Exhibition, and tend to the advancement of Art. With additional space for the Exhibition, it would also be possible to avoid placing works of merit so high or so low as to be in a great measure sacrificed.

The want of space and light for the due exhibition of Sculpture has been long noticed, not only by the artists and the public, but in Parliament; and the evil is, in this case, too apparent to require that we should enlarge upon it.

3rd. While some of the schools are necessarily closed for a time from the causes above adverted to, it may be inferred that there is no superfluous room for the accommodation of the officers and attendants of the Academy. By the original regulations of the Institution, the Secretary should reside on the Establishment; but from want of space he is provided with a residence elsewhere at a considerable expense to the Academy. The residence of the Keeper on the premises is indispensable; but even in his case, the accommodations are insufficient; and those of the attendants are throughout reduced to the narrowest and most inconvenient limits.

Without reference to the Royal Academy, but merely to the uses of the building to whatever purposes it may be applied, it remains to observe that the division of the building by the two intersecting public passages or thoroughfares which now separate the lower story into three parts, occasion great inconvenience and loss of space. It is sufficient to point out an evil, which ought perhaps never to have been permitted in the first instance, to induce a reconsideration of this subject, with a view to obviate so glaring a defect in the internal arrangements of the building. Much space is also lost by the vast hall on the side of the National Gallery.

Having thus stated the inconveniences to which the Royal Academy is subjected from want of room, and the serious impediments to its usefulness which these inconveniences occasion, we respectfully invite Your Majesty to consider whether, in the event of the works of Art in the National Gallery being removed elsewhere, it might not be possible to allow the Academy to occupy the space at present required for those works so as to provide sufficient room for all the schools, for the Exhibition of Painting, Sculpture, and Architecture, for the Library, and for the accommodation of the Officers and Attendants.

The whole building would not be at all too large for these objects; and when the time shall come for remodelling the plan of the entrance halls, and making other alterations, the building might be greatly improved in its external appearance, and be rendered more suitable for the accommodation of the Royal Academy.

(Signed) C. L. Eastlake, *President.*

Daniel Maclise. Clarkson Stanfield.
W. F. Witherington. David Roberts.
S. A. Hart. Philip Hardwick.
R. Westmacott. Charles Barry.

J. P. Knight, *Secretary.*

Royal Academy,
26th May, 1851.

APPENDIX I.

Copy of Memorial from London Merchants, &c., on the formation of a Museum of the Natural Productions of all Countries in the City of London.

To the Executive Committee of the Exhibition of the Industry of all Nations.

Gentlemen, *London, October* 16, 1851.

Understanding that Her Majesty's Commissioners propose forming a collection of the Raw Produce of different countries, shown in the Great Exhibition, we beg leave to express our conviction of the high practical value of this plan.

We anticipate great benefits to merchants, manufacturers, and brokers from the formation of a great trade museum or collection, of which this would be the foundation, and in which specimens of the natural productions or exports of all countries should be deposited, together with such accurate, scientific, practical, and commercial information as can be procured.

Such a museum would at all times give the most valuable aid to the mercantile community, and afford that information which is so constantly required, and which there is now no means of obtaining.

We would beg to suggest that, in order to render such a collection really available for trade purposes, it should be formed in the City of London, and so situated as to be conveniently accessible to those who want to refer to it.

We have the honour to be,
Gentlemen,
Your obedient Servants,

Thomson Hankey, Jun.	Hanson, Brothers, & Co.
John G. Hubbard.	Gregson & Co.
J. H. Pelly.	Powles, Brothers, & Co.
William Cotton.	J. Thomson, T. Moreau, & Co.
J. B. Heath.	Herman Sillem, Son, & Co.
H. J. Prescott.	Doxat & Co.
R. W. Crawford.	W. C. & H. Harnett.
H. W. Blake.	Alfred Janson.
James Morris.	Cha. R. Harford.
J. Masterman.	Geo. Fred. Young.
Morris, Prevost, & Co.	T. Green & Co.
John Chapman & Co.	George Denny.
Overend, Gurney, & Co.	George Fenning.
Durant & Co.	D. Dunbar.
Geo. Carr Glyn.	J. Wild & Sons.
Forster & Smith.	Horne, Eagar, & Co.

On behalf of the Committee for managing the affairs of Lloyd's,

John Robinson, *Pro-Chairman.*

On behalf of Lloyd's Register of British and Foreign Shipping,

Thomas Chapman, *Chairman.*

London: Printed by W. Clowes and Sons, Stamford Street, for Her Majesty's Stationery Office.

SECOND REPORT

OF

THE COMMISSIONERS

FOR THE

EXHIBITION OF 1851,

TO THE

RIGHT HON. SPENCER HORATIO WALPOLE, &c. &c.

ONE OF HER MAJESTY'S PRINCIPAL SECRETARIES OF STATE.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY W. CLOWES & SONS, STAMFORD STREET,
FOR HER MAJESTY'S STATIONERY OFFICE.
1852.